

# Contents

THEME ONE : Systems

## UNIT ONE : Living Systems

Concept

**1.1**

### Adaptation and Survival :

- Lesson 1	14
- Lesson 2	19
- Lesson 3	26
- Lesson 4	33
- Lesson 5	46
- Lesson 6	53

Concept

**1.2**

### Sense at Work :

- Lesson 1	60
- Lesson 2	65
- Lesson 3	70
- Lesson 4	73
- Lesson 5	75
- Lesson 6	78

Concept

**1.3**

### Light and Sight :

- Lesson 1	82
- Lesson 2	88
- Lesson 3	92
- Lesson 4	96
- Lesson 5	100
- Lesson 6	102

Concept

**1.4**

### Communication and Information Transfer :

- Lesson 1	108
- Lesson 2	114
- Lesson 3	119
- Lesson 4	122
- Lesson 5	127
- Lesson 6	130
- Unit Project	131
- Interdisciplinary Project	133
- Glossary	136

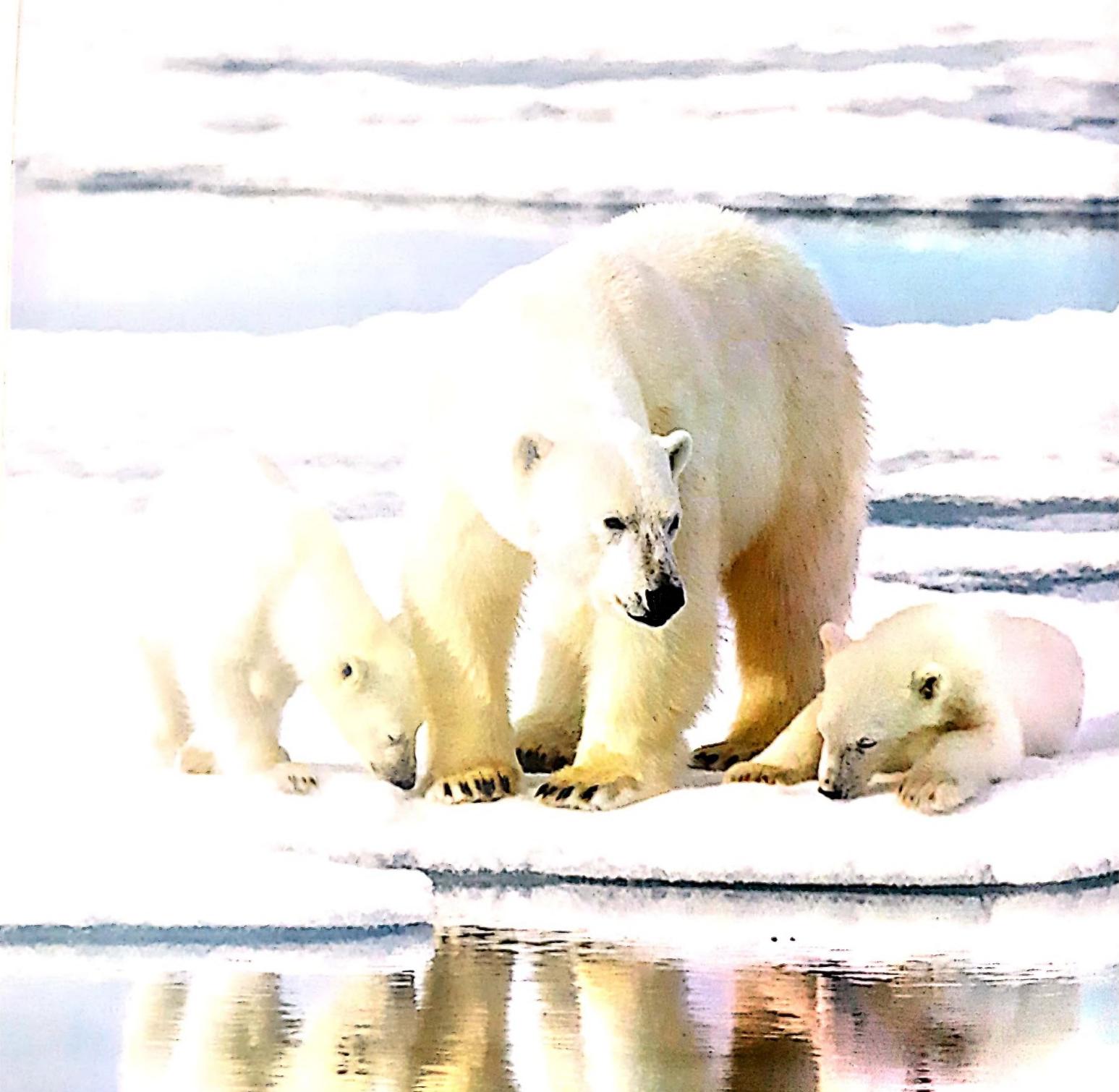
**THEME ONE :  
SYSTEMS**

**UNIT ONE :  
LIVING SYSTEMS**



**Concept  
1.1**

**Adaptation and  
Survival**





## Learning outcomes

By the end of this concept, your child will be able to :

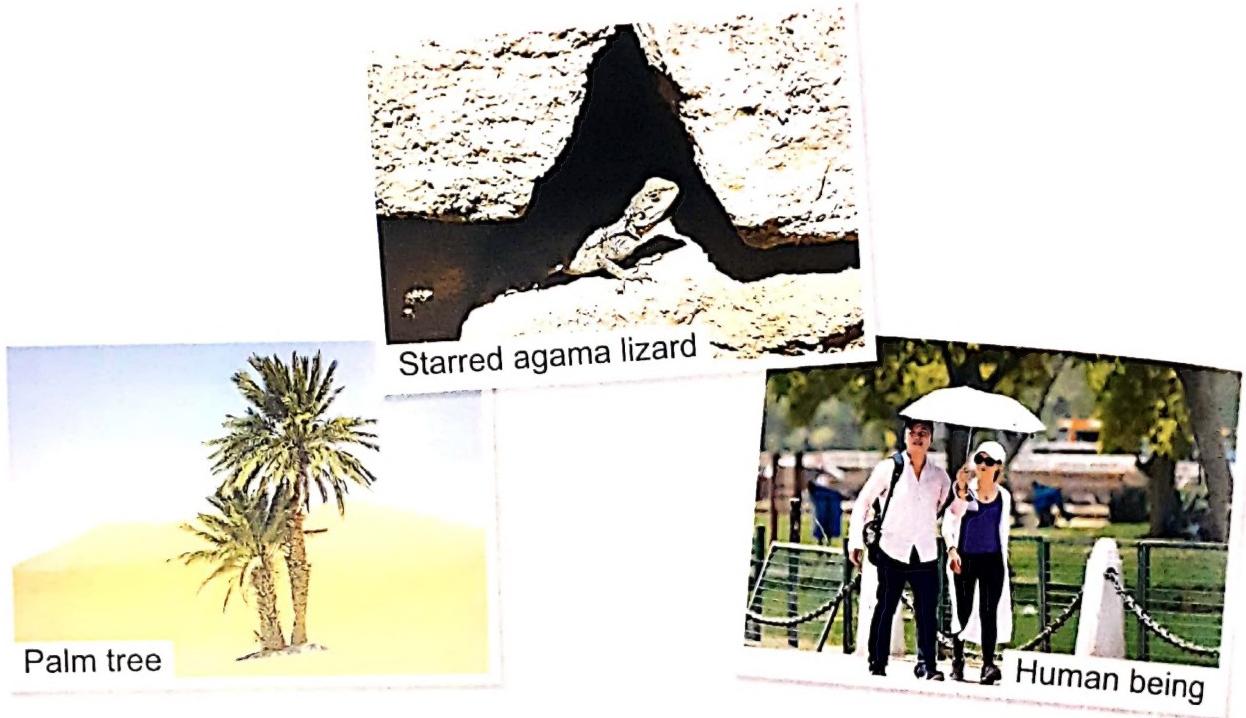
- Model the relationships among an organism's survival, habitat, adaptations, and body systems.
- Argue from evidence that plants and animals have structures and behaviors that help them survive and grow.
- Explain how structural adaptations help organisms survive in specific environments.
- Argue from evidence that multiple adaptations or organs work together in systems to help organisms survive in specific habitats.



## Key vocabulary

• Adaptation	• Arctic	• Camouflage	• Digestive system
• Disease	• Ecosystem	• Energy	• Extinct
• Feature	• Hibernate	• Migration	• Ocean
• Organism	• Pollute	• Predator	• Prey
• Reproduce	• Stomach	• Survive	• Trait

# Can You Explain?



- ▶ Do you notice how each of the previous living organisms protect itself from extreme heat of the Sun ?
  - **Starred agama lizard** that lives in the desert protects itself by keeping itself cool by finding shaded area during a hot sunny day.
  - **Palm leaves** are covered with waxy layer to protect them from extreme hot climate.
  - **Human being** protects himself from extreme hot climate by using umbrella and light clothes.
- ▶ Each of the previous living organisms has its own way to protect itself from extreme hot climate, and these different ways are known as “Adaptation”.

### Adaptation :

It is a characteristic of living organisms that allows them to change over generations and helps them to survive and reproduce in the ecosystem.

### ▶ In this chapter, we will study :

- Types of adaptation.
- Adaptation in some plants.
- Adaptation in some animals.
- Adaptation in human.

### Notes for parents

- Explain to your child how living organisms can adapt to the environment in which they live.

## Activity 2

### Penguin Feet

► Climate is considered one reason for adaptation of many living organisms over generations.

- Can you stand on ice in barefeet for about 5 minutes.



- Can a penguin walk on ice for a long period of time ?



► Adaptation of penguins to survive in cold environment :

- **Penguin** makes different adaptations to be able to live in **polar climate** that is characterized by extreme cold.

- **Its habitat :**

They live in **Antarctica** that is one of the coldest places on the Earth.

- **Its adaptation :**

Let's know how the penguin's feet don't freeze in the cold environment :

- **Penguin has an insulating layer of fat and thick downy feathers** that trap warm air against the skin to keep its body warm in the freezing cold.

- Although the penguin toes' feet have no feathers, no fat, it can stand around on the ice all the day. This happens due to the way of movement of blood in blood vessels through the penguin's feet.



► The way of moving the blood through the penguin's feet to keep them warm:

Blood vessels bring cold blood up from the feet.



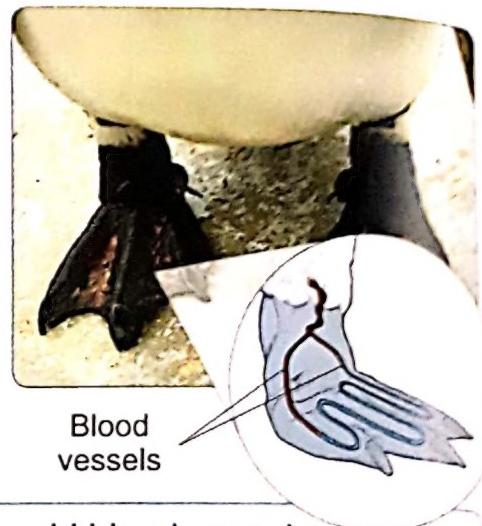
Other blood vessels bring warm blood down to the feet from the feather-coated body.



The warm blood vessels weave around the cold blood vessels.



When they meet, the warm blood vessels heat up the cold blood vessels, so the heat transfers to the penguin's feet.



- This means that the blood moving up into the penguin's body is not cold and the blood moving down to the penguin's toes is warm enough to keep its toes from freezing.



### Check your understanding

► Put (✓) or (✗):

1. The blood vessels coming upwards from the penguin's feet carry warm blood. ( )
2. Penguins can adapt to live in extreme cold environment by having feathers and fat in their feet. ( )

► Look at these pictures, then answer the question :

- In your opinion, what is the suitable environment from the opposite environments in which the penguin can live ? (Give a reason for your choice).



Desert region



Forest region



Polar region

### Notes for parents

- Discuss with your child how the movement of blood inside the penguin's feet helps it keep its feet warm.

### Activity 3

## Adaptations for Survival

- ▶ You have known that adaptation help living organisms to survive and reproduce in the ecosystem in which they live.
- ▶ Now, you will study camouflage as an example of adaptation.

### Camouflage :

It is an example of adaptation in which some animals hide from their predators or their preys by blending in with the surrounding environments.

- ▶ Adaptation of some animals to survive in their environments through camouflage :

#### 1 Polar bear

- Its habitat :

It lives in the arctic region.

- Its adaptation :

It has white and thick fur :

- Its white fur to help it blends in with the snow as it sneaks up on its prey.



Polar bear



#### Note

Its thick fur to help it stays warm in its cold arctic home.

#### 2 Brown bear and dark bear :

- Their habitat :

They live in forests.

- Their adaptation :

They have dark fur to help them stay hidden among the trees as they hunt.



Dark bear



Brown bear

### 3 Caracal and fennec fox

- **Their habitat :**

They live in **desert**.

- **Their adaptation :**

**They have sandy-colored fur (tan-colored fur)** to help them hide and blend in with desert landscapes.



Caracal



Fennec fox

### 4 Some types of lizards

- **Their habitat :**

Some types of lizards live in desert, while other types live in other environments among quite colorful rocks.

- **Their adaptation :**

**They have colorful scales** that make them hard to see among the rocks.



Lizard



### Check your understanding

► Put (✓) or (✗) :

1. Polar bear has a dark fur to blend in with the snow. ( )
2. In a polar region, a fennec fox preys a young polar bear. ( )

► Choose :

- In the polar region, a polar bear sneaks up on ..... to get its food.



a. Penguin



b. Camel



c. Fennec fox



d. Tiger

In the Exercises Book :

Try to answer :

- Exercises on Lesson ① p. 5
- Self-Assessment ①

### Notes for parents

- Let your child explains how caracal, fennec fox and some types of lizards can adapt to live in their environments through camouflage.

# Lesson 2

## Activity 4

### Types of Adaptations

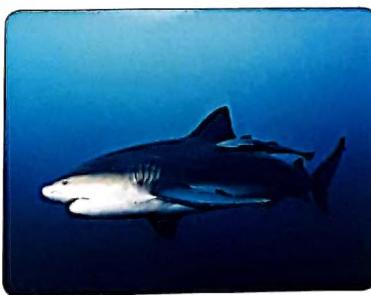
- Classify the following animals according to the environments where they live in :



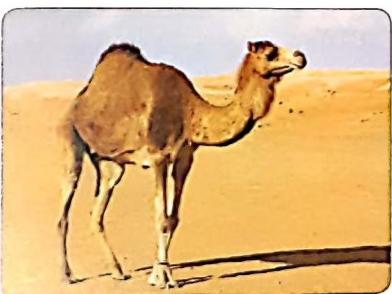
Fennec fox



Polar bear



Bull shark



Camel



Desert lizard



Arctic fox



Penguin



Octopus

Cold polar regions	Hot deserts	Oceans
.....	.....	.....
.....	.....	.....
.....	.....	.....

- You have known that adaptation is a change made over generations that helps the animals to survive.
- Now, you will study the types of adaptations.

- Help your child to classify the previous animals according to their suitable environments.

## Types of adaptations

### 1. Structural adaptation (or physical adaptation)

*It is a change in the structure of the animal's body to adapt its environment.*

- The blood vessels in the penguin's feet.



- The thick fur of the polar bear.



### 2. Behavioral adaptation

*It is a change in the behaviors or acts of a group of animals to adapt its environment.*

#### Examples

- Desert lizard looks for shade during hot sunny days.



- Migration of some animals towards certain regions.



(Migration means : travelling of some animals long distances at certain time of the year).

## ► Adaptation of foxes to survive in their environments :

- Fennec foxes and arctic foxes both live in dry desert climates.

### 1 Fennec fox

#### • Its habitat :

It lives in hot deserts.

#### • Its structural adaptation :

- It has a tan-colored coat (sandy-colored fur) that :

- provides camouflage to hide in a sandy, rocky environment.
- protects it from the hot Sun.

- It has extra-large ears that help the fennec fox to lose the heat to cool its body.

- It has a special shape of ears that allow excellent hearing to help fennec fox hunts.

#### • Its behavioral adaptation :

- It pants like dogs, where it takes up to 700 breaths per minute to cool its body.

- It lives in burrows which are excellent places to stay cool during the sunny days.

- It eats different kinds of food, like insects, fruit, plant roots and even leftovers from another animal's prey because food can be hard to find at the hot, dry deserts.



Fennec fox



### 2 Arctic fox

#### • Its habitat :

It lives in tundra which is a different type of deserts with temperature as cold as (50°C) below zero in the winter months.



Arctic fox in winter

#### • Its structural adaptation :

- It has a thick fur coat to keep its body warm in extreme cold climate.

- Its fur coat is white during winter, but turns brown in summer when the snow melts to help it sneak up on prey in any season.

- It has short ears and legs to help it stay warm.

- It has a special shape of ears that allow excellent hearing to help arctic fox hunts.



Arctic fox in summer

- Discuss with your child the habitat, structural adaptation and behavioral adaptation of the fennec fox and arctic fox.

- **Its behavioral adaptation :**

- It lives in burrows which are excellent places for it to stay warm at night.
- It eats different kinds of food, like insects, fruit, plant roots and even leftovers from another animal's prey because food can be hard to find at the cold tundra.



► **Adaptation of bull shark to survive in its environments :**

- There are many types of sharks, most of them can only live in salt water.
- One of the amazing types of sharks is the "**bull shark**" that its body is adapted to survive in both salt water and fresh water.

### 3 Bull Shark

- **Its habitat :**

It lives in **fresh** water and **salt** water.



Bull shark

- **Its structural adaptation :**

- Its body is adapted to survive in **fresh water**, so it has a unique advantage over other sharks.
- It has a dark back and white belly that causes the following :

- When an animal swimming above the bull shark looking down into the ocean may not see the shark in the shadows due to its dark back.
- When an animal swimming underneath the bull shark and looking up, the bull shark may blend in with the bright light of Sun due to its white belly.

*So*, the bull shark can sneak up on prey using a camouflage strategy called "countershading".

- It has sharp teeth to help it sneak up its preys and tear their flesh.

- **Its behavioral adaptation :**

- It can hunt in different places like salt water or fresh water, so it can feed on different types of food.
- It hunts in the day as well as the night, so its prey cannot predict when this shark will hunt next time.

#### Notes for parents

- Discuss with your child the habitat, structural adaptation and behavioral adaptation of the bull shark.

## Note

In fresh water, bull sharks have less competition for finding food, because there are no other sharks live in fresh water to share the bull shark its food.



## Check your understanding

### ► Write the scientific term :

1. It is a change in the structure of the animal's body to adapt its environment. ( ..... )
2. It is a change in the behaviors or acts of a group of animals to adapt its environment. ( ..... )

### ► Use the following structural and behavioral adaptations of the following animals to complete the table below :

Hunts in day and night – Tan coloration – Panting – Sharp teeth – Short ears and legs – Big ears – Can live in fresh water – Camouflage by season – Countershading.

Animals	Structural adaptation	Behavioral adaptation
Fennec fox	<ul style="list-style-type: none"><li>• .....</li><li>• .....</li><li>• Strong sense of hearing.</li></ul>	<ul style="list-style-type: none"><li>• .....</li><li>• Living in a burrow.</li><li>• Eat different kinds of food.</li></ul>
Arctic fox	<ul style="list-style-type: none"><li>• .....</li><li>• .....</li><li>• Strong sense of hearing.</li></ul>	<ul style="list-style-type: none"><li>• Living in a burrow.</li><li>• Eat different kinds of food.</li></ul>
Bull shark	<ul style="list-style-type: none"><li>• .....</li><li>• .....</li><li>• .....</li></ul>	<ul style="list-style-type: none"><li>• Eat different kinds of food.</li><li>• .....</li></ul>

- Let your child answer the questions to check his/her understanding.

## Activity 5

# Panther Chameleon

- You have known that there are many types of lizards that are found all over the world in different environments.
- **Lizards** are from reptiles that are an ancient type of animals.
- Bodies of reptiles such as lizards are covered with scales.

**Examples of lizards :**



**Starred agama lizard**  
(lives in very hot desert).



**Panther chameleon**  
(lives in tropical rainforest).

### ► Adaptation of the panther chameleon to survive in its environment :

#### Panther chameleon

- **Its habitat :** It lives in the **tropical rainforest**.
- **Its structural adaptation :**
  - **It has brightly colored scales** that provide camouflage with its surrounding environment that contains green leaves and colorful flowers.
  - **Chameleon eyes move in opposite directions**, where each eye can move independently from the other, so :
    - One eye can be searching for something to eat like insects, while the other eye is on the lookout for danger in a totally different direction.
    - This adaptation allows the panther chameleon to hunt its prey and avoid becoming a prey at the same time.
  - **It has a very long sticky tongue** to hunt insects for feeding.
  - **It has V-shaped feet and a tail like a hand** to hold tightly the branches of trees.



#### Notes for parents

- Discuss with your child the structural and behavioral adaptations of the panther chameleon.

• Its behavioral adaptation :

- When chameleon finds itself in danger, it doesn't have teeth or claws for defense, but it has one last trick to scare its attacker, where it appears as fierce as the following :

**1** It puffs up its body with air.



**2** It opens its mouth wide.



**3** It changes the colors of its scales.



### Check your understanding

► Complete the following table which describes the types of adaptations that help chameleon to survive :

Adaptation	Type of adaptation : Structural (S) or Behavioral (B)	This adaptation helps chameleon to ...
Bright colored scales.	.....	Camouflage to hunt and hide.
.....	.....	Balance and move.
Eyes move in different directions.	.....	.....
.....	.....	Scare its enemies.
Changing colors.	.....	Scare its enemies.

In the Exercises Book :

Try to answer :

- Exercises on Lesson ② p. 10
- Self-Assessment ②

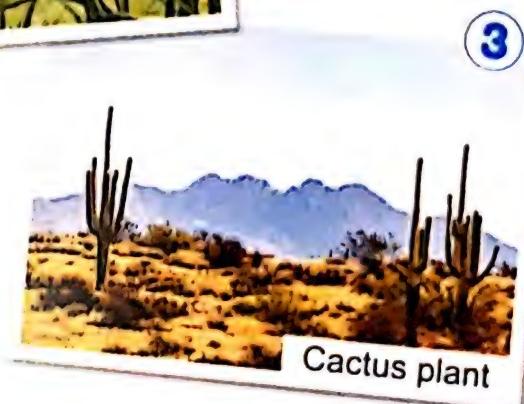
- Help your child complete the table to differentiate between different types of adaptations in panther chameleon.

# Lesson 3

## Activity 6

### Plant Adaptations

► Look at these plants, then choose the correct answer :



#### 1 Water lily plant :

Water lily plant grows and survives in ..... (desert – snow – wetland)

#### 2 Pine trees :

Pine trees grow and survive in ..... (desert – snow – wetland)

#### 3 Cactus plant :

Cactus plant grows and survives in ..... (desert – snow – wetland)

- From the previous examples of plants, we notice that the different types of plants are adapted to survive in different environments.
- Plants can grow in every place that sunlight shines, even the bottom of sea ice in polar regions has tiny plants growing on it.
- Like animals, plants have structural and behavioral adaptations that help them survive and grow in their environments.

#### Notes for parents

- Let your child observe the photos and think where each of the previous plants can grow & survive.

► Now, we will study two terrific trees which are :

**Acacia tree**  
(umbrella-shaped tree).



**Kapok tree**  
(umbrella-shaped tree).



### Two terrific trees

The two previous trees grow in two different environments, where acacia tree lives in **savannah forest** in Southern Africa and kapok tree lives in **Amazon rainforest** of Brazil.

#### • Characteristics of savannah forest in Southern Africa :

- Savannah forest is a grassland habitat.
- The temperature in the savannah forest is mild.
- In the savannah, there is extreme lack of water during the dry season which lasts for half of the year without rainfall.
- Savannah forest is characterized by drought conditions, so most of large plants can't grow.
- When you look over the savannah, you can see one large tree scattered through out the landscape which is acacia tree (umbrella-shaped tree).



Savannah forest

#### • Characteristics of Amazon rainforest of Brazil :

- In the rainforest, it is easy to find water, where it is rainy most of the year.
- It is hard for plants in the rainforest to reach sunlight.
- The rainforest has a soggy soil which means that it is a wet muddy soil.
- The rainforest is characterized by strong winds.
- The trees in the rainforest grow up to 70 meters tall, there is a tree that emerges high above other trees which is kapok tree (umbrella-shaped tree).



Amazon forest

- Discuss with your child the characteristics of savannah forest and Amazon forest.

## ► Adaptation of the two terrific trees to survive in their environments :

### 1 Acacia tree (umbrella-shaped tree)

#### • Its habitat :

It grows in savannah forest in Southern Africa.

#### • Its structural adaptation :

##### Root

- It has a very long root grows directly downward known as the "taproot".
- This root searches for water as deep as 35 meters below the soil surface.



Acacia tree

##### Trunk

- Its trunk is very long, so most animals except giraffe cannot reach its leaves to feed on.
- Acacia tree stores water in its trunk.

##### Leaves

- It has tiny leaves growing on its top to help it hold in water, while soaking up sunlight needed to make food.
- Its leaves have sharp spines to protect them from hungry mouths of animals.



Leaves of  
Acacia tree

#### Notes

- Acacia is adapted to survive through many months of drought in its environment.
- The trunk in acacia tree stores water as the hump in the camel stores fat.

#### • Its behavioral adaptation :

##### Acacia tree can defend itself as follows :

- When an animal begins eating the leaves of the acacia, the tree also begins to produce a poison that makes the leaves taste very bad.
- Then it sends a smelly message in the wind to acacia trees nearby telling them to start making the same poison.

#### Notes for parents

- Discuss with your child the habitat, structural adaptations and behavioral adaptations of acacia tree

## 2 Kapok tree (umbrella-shaped tree)

- **Its habitat :**

It grows in the Amazon rainforest of Brazil.

- **Its structural adaptation :**

### Root

- The kapok tree stays firmly rooted due to large, wide roots called buttress roots.
- Buttress roots are not planted deeply in the ground but they grow high up on its trunk to hold the tree firmly in the soggy soil.
- Some of these roots can start up to 5 meters above the ground.



Buttress roots of kapok tree

### Leaves

**It has hand-shaped leaves with narrow parts that allow wind to move more gently through the leaves without tearing them.**



Leaves of Kapok tree

- **Its behavioral adaptation :**

- The kapok tree uses the wind to send a different type of messages than the acacia, where the kapok tree invites bats to come visit its delicious-smelling flowers through these smelly messages.

### Note

The wind also carries the tree's fluffy yellow seeds across the forest.



kapok seeds



### Check your understanding

► Look at this picture below, then answer the question :

- Do you think this giraffe can continue eating a lot of leaves of acacia tree ?  
(Give a reason for your answer).

Yes

No



- Discuss with your child the habitat, structural adaptations and behavioral adaptations of kapok tree.

## Activity 7

# Plant Scientist

Plants have different properties that help them to survive in their environments as they grow in different ways according to the environmental conditions as we will study in the following examples :

Plant	Its habitat	Its structural adaptation	This adaptation helps the plant to survive because
 Mangrove tree	Salt water	It has long and strong roots.	The long and strong roots help the plant to resist the waves.
 Water lily	Wetland	It has wide leaves that float on the water surface.	The wide leaves help the plant to absorb a big amount of sunlight.
 Palm tree	Desert	<ul style="list-style-type: none"> <li>- It has thick roots.</li> <li>- It has small leaves.</li> </ul>	Both thick roots and small leaves help the plant to resist the strong winds.
 Pine tree	Snow	<ul style="list-style-type: none"> <li>- This tree has a triangular shape.</li> <li>- It has short branches.</li> <li>- It has needle leaves.</li> </ul>	<ul style="list-style-type: none"> <li>- The triangular shape of this tree and its short branches allow the snow to slide easily over it, so its branches don't break.</li> <li>- The needle leaves prevent the plant from losing of water.</li> </ul>

### Notes for parents

- Discuss with your child the properties of some plants that help them to survive in different environments.

	Savannah	Its branches grow and gather on the top of its trunk.	The branches at the top of its trunk <b>prevent the animals from reaching the leaves on the tip of these branches.</b>
	Desert	It has sharp spines.	The sharp spines <b>prevent the animals from eating its leaves and fruits.</b>

► From the previous table we can conclude that :

- All plants have roots, stems (trunks) and leaves.
- Plants differ in the structure and shape of their roots, stems and leaves to adapt the environmental conditions to survive and grow in their environments.

### What happens if ... ?

A plant is taken from its original environment and placed in another different environment.

This plant may die or may adapt the new environmental conditions to survive and grow in its new environment.



### Check your understanding

► Put (✓) or (✗) :

1. Palm tree has short roots and big leaves. ( )
2. Water lily plant live in salt water. ( )
3. Mangrove tree has long and strong roots to help the plant to resist the waves. ( )

## Activity 8

# Identifying Adaptations

You have known from the previous explanation that plants live in different environments and they adapt the different environmental conditions in their ecosystem through the structure of leaves, stems (trunks) and roots.

► Look at these photos, then choose the correct answer :

- These plants grow and survive in .....  
(snow – desert – rainforest)
- The roots of these plants are ..... to absorb  
a big amount of water.  
(short – long – small)
- The leaves of these plants have sharp spines  
to .....  
(prevent the animals from eating them – absorb a big  
amount of water – absorb a big amount of sunlight)
- The shape of the roots and leaves of these plants is considered as .....  
(structural adaptation only – behavioral adaptation only – structural and behavioral  
adaptations)



Figure (1)

- These plants grow and survive in .....  
(snow – desert – rainforest)
- The roots of these plants ..... because it is easy  
to find water.  
(grow deeply in the soil – grow near the soil  
surface – come out of their leaves)
- The leaves of these plants are big to .....  
(absorb a big amount of water – absorb a big amount of sunlight – resist the strong  
waves)
- The shape of the roots and leaves of these plants is considered as .....  
(structural adaptation only – behavioral adaptation only – structural and behavioral  
adaptations)



Figure (2)

## Notes for parents

- Help your child observe the photos, then answer the questions to know how to identify different adaptations in different plants.

In the Exercises Book :

Try to answer :

- Exercises on Lesson ③ p. 17
- Self-Assessment ③

## Digestive System

► Observe the following figures, then complete the sentences below :



Figure (1)



Figure (2)

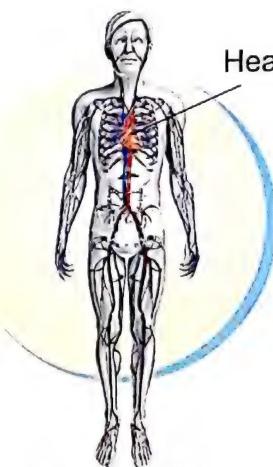
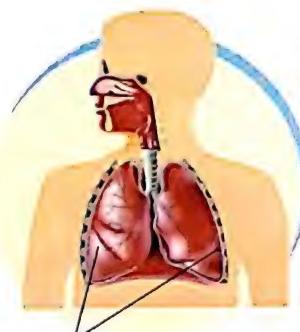


Figure (3)



Two lungs

Figure (4)

- Figure ..... represents the human digestive system.
- Figure ..... represents the human respiratory system.

► How are body systems adapted to meet the needs of living organisms ?

- Each living organism has different ways to adapt to the environment in which it lives, so :

- The body of a living organism (human or animal) consists of some systems, that are differ in their structures to perform specific functions to get its needs of food, breathing, .... etc.
- Each system consists of a group of organs that are working together to perform a specific function.
- Digestive system and respiratory system are examples of systems found in the body of human or animal.

### Note

Digestive system and respiratory system are working together to get energy from food and breathing.

- The body gets nutrients from food that provide the body with the needed energy.
- The body needs energy to :

**Do activities** , such as (walking, talking or sleeping).

**Do functions inside it**, such as (heart beating, breathing and thinking).

- Help your child to identify the human body systems especially, the digestive system and the respiratory system.

## **Note**

In one day, you need a lot of energy, your heart beats around 100.000 times, you take over 20.000 breaths, and thousands of steps.

- In this lesson, we will study :

1. Human digestive system.
2. Digestive systems of some animals and comparing them with the human digestive system.
3. Human respiratory system.

### **Human digestive system**

- To get nutrients from food, it must pass through different organs of the digestive system which are working together to break down food into smaller parts that your body can use in a process called digestion process.

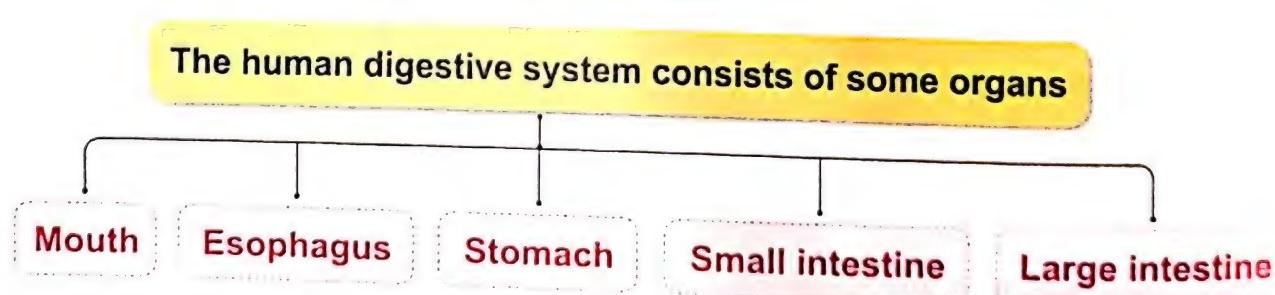
#### **Digestive system :**

It is the system responsible for breaking down food into small parts to enable the body cells to use them in getting energy.

#### **Digestion process :**

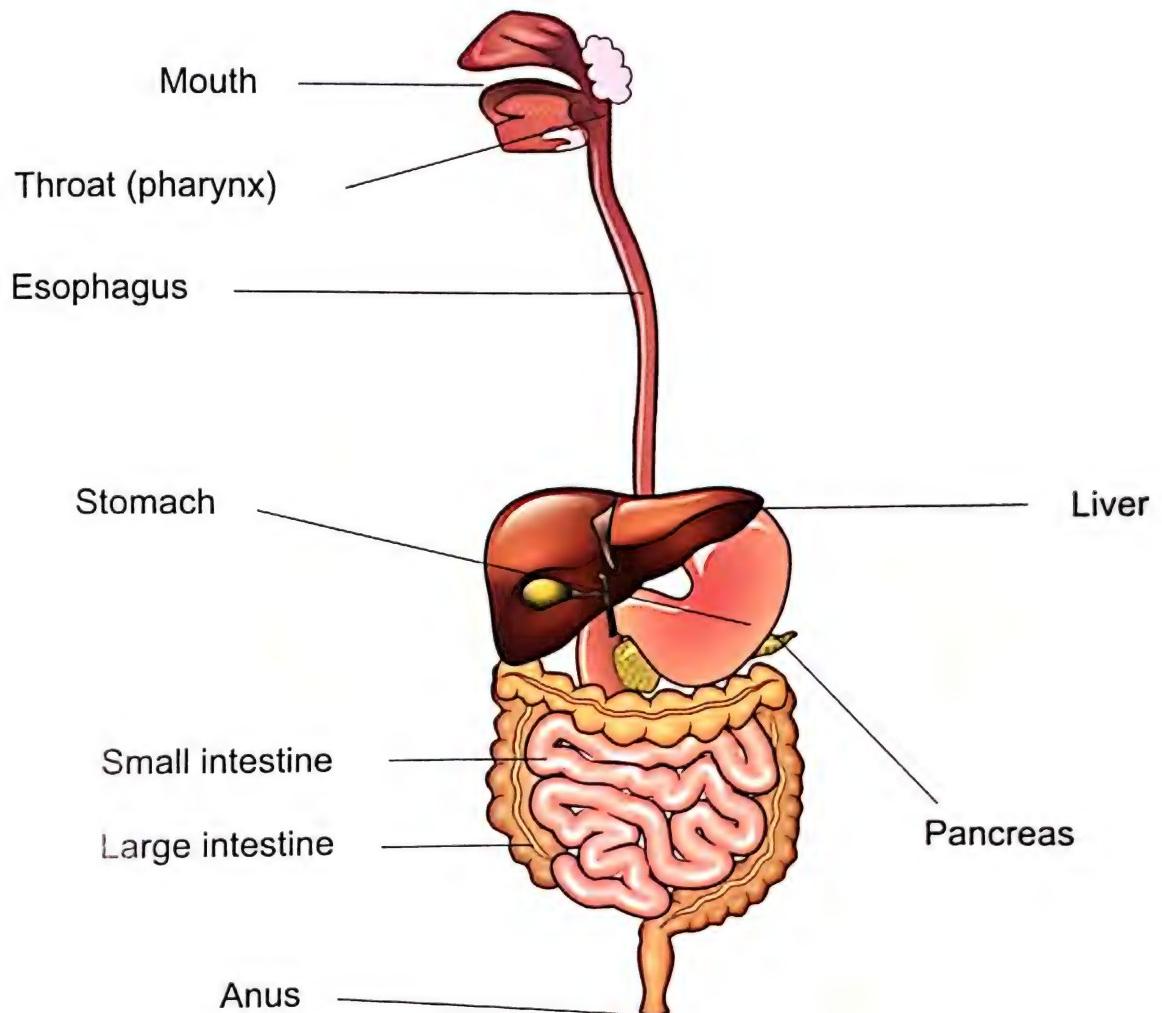
It is the process of breaking down food and changing it into chemical substances that the body absorbs and uses them in getting energy and growth.

#### **The structure of the digestive system :**



#### **Notes for parents**

- Discuss with your child the importance of the digestive system and the meaning of digestion process.



**The human digestive system**

**Notes**

- Digestive system starts with **mouth** and ends with **anus**.
  - The organs of the digestive system are connected and organized in a way that allows food to complete the process of digestion, starting from the mouth to the stage of excretion.
- Help your child to identify the organs of the digestive system.

## 1 Mouth

- Digestion begins in the mouth.
- Mouth contains :
  1. Teeth.
  2. Saliva (it is a liquid substance in the mouth).
  3. Tongue.

### - Function of teeth :

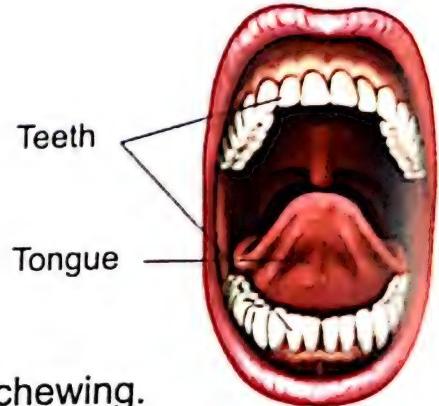
They break down and crush food in the mouth during chewing.

### - Function of saliva :

- It helps in the digestion of some types of food, (where it digests starch and changes it into sugar).
- It facilitates the swallowing of food.

### - Function of tongue :

It mixes food with saliva in the mouth.

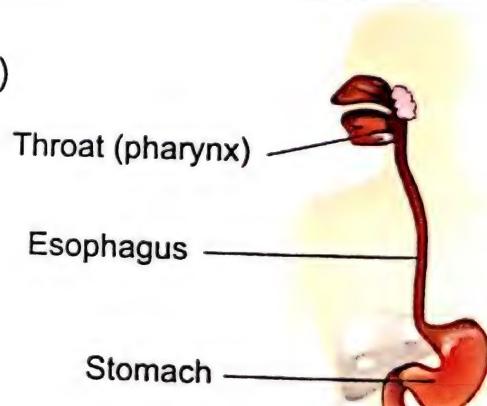


## 2 Esophagus

- During swallowing the food, the throat (pharynx) pushes the food into a tube called esophagus.
- Esophagus is a long muscular tube.

### - Its function :

It moves the food down into the stomach.



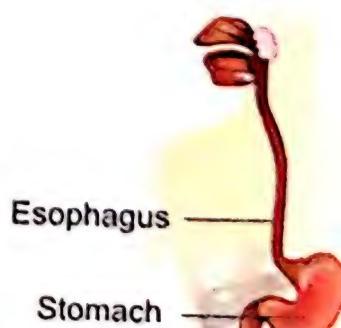
## 3 Stomach

- It is a muscular organ.

### - Its function :

The stomach mixes food with the stomach acid and digestive juices (enzymes) found in it to change the food into a soupy liquid.

- Food stays in the stomach for a few hours, then the muscles of the stomach move the food into a long, winding tube called **small intestine**.

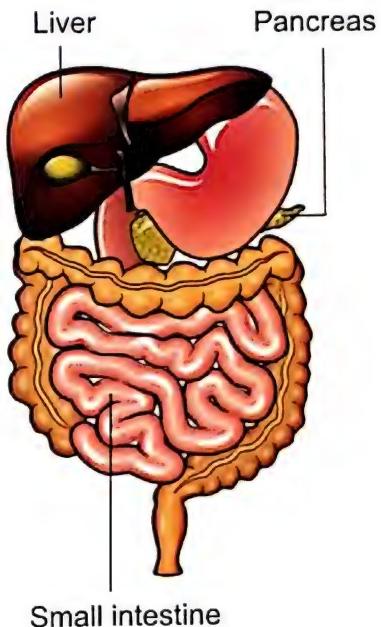


### Notes for parents

- Discuss with your child the functions of mouth (teeth, saliva, tongue), esophagus and stomach.

#### 4 Small intestine

- It is a long, winding tube as its length is more than six meters.
- Food is broken down into simple nutrients in the small intestine, where :
  - Pancreas and liver secrete juices that flow into the small intestine.
  - These juices help in breaking down the food into nutrients (or digested food).
  - These nutrients are absorbed through the wall of the small intestine as they enter into tiny blood vessels and reach the blood.
  - The blood carries the nutrients to all parts of the body.
- **Its function :**
  - It completes the digestion of different types of food.
  - It absorbs the nutrients (digested food).
- The body does not benefit from some parts of food known as undigested materials that flow into the large intestine.

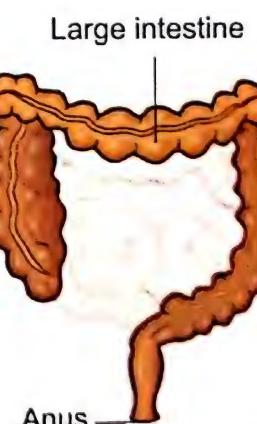


#### 5 Large intestine

- It is a tube that starts from the end of the small intestine and ends with the anus.

- **Its function :**

It absorbs water from the undigested materials, so they become solid wastes that come out through the anus.



- Discuss with your child the functions of the small intestine and the large intestine.

## **?** What happens when ... ?

**One of the organs of the digestive system is absent.**

The digestive system will not perform its function properly if one of its organs doesn't exist.

**How can you keep the digestive system healthy ?**

- ① Chew the food well.



- ② Don't eat much fast meals.



- ③ Drink a lot amount of water.



- ④ Practice sports regularly.



### Check your understanding

► Put each of the following words in front of its suitable sentence :

(Teeth – Esophagus – Stomach – Saliva – Small intestine – Tongue – Large intestine)

1. It mixes food with acid and digestive juices. (        )
2. It changes starch into sugar. (        )
3. It absorbs water from the undigested materials. (        )
4. It completes the digestion of different types of food. (        )
5. They break down and crush food during chewing. (        )
6. It mixes food with saliva. (        )
7. It moves the food down into the stomach. (        )

### Notes for parents

- Discuss with your child how we can keep the digestive system healthy.

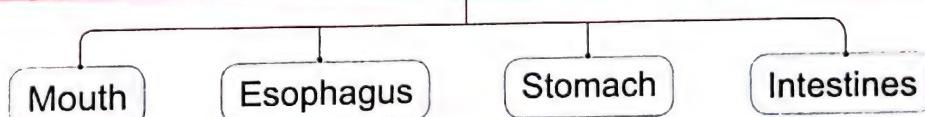
## Activity 10

# Body Systems

► From the previous activity, we can conclude the general function of the digestive system :

- Extracting nutrients from the food we eat.
- Digestion of food and its absorption to obtain the needed energy.
- Like human, animals need to get nutrients and energy from food they eat.
- The digestive systems of dogs and cows are alike in some ways and similar to the human digestive system, where each of them starts at the mouth and ends at the anus to obtain and absorb nutrients from food.
- **But**, there are some differences in the structure of the digestive systems of humans, cows and dogs because the digestive systems of some animals have structural adaptations to digest different types of food.

The digestive system of cow and dog consists of :



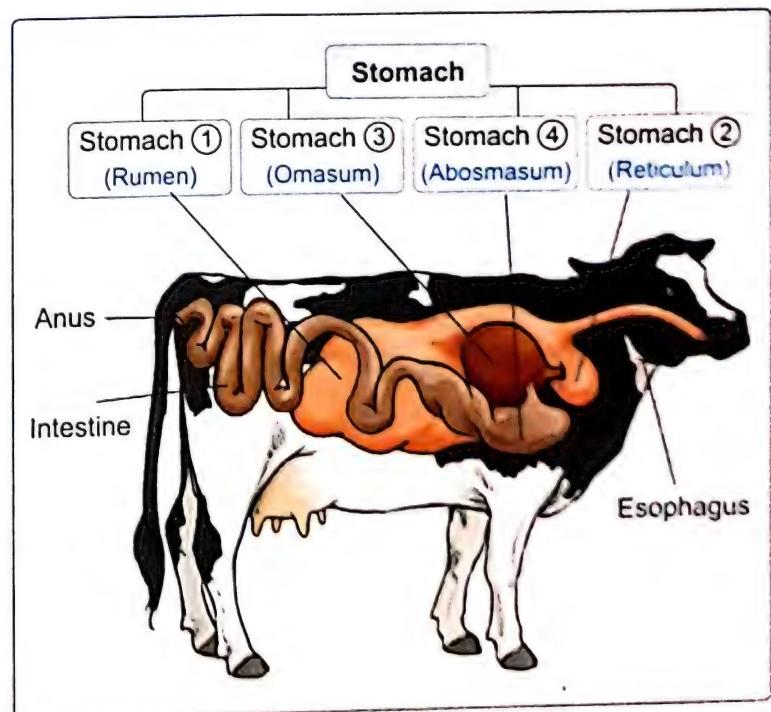
### Adaptation of the digestive system of cow

- Cow eats grass.
- Grass is very difficult to be digested, so cow has a long digestive system and also some organs of its digestive system are adapted to digest this type of food such as :

#### Stomach

- Cow is characterized by having four stomach-like organs (compartments) which are :

- Stomach ① [Rumen]
- Stomach ② [Reticulum]
- Stomach ③ [Omasum]
- Stomach ④ [Abomasum]



- Let your child think about the similarities and differences between the digestive systems of humans, cows and dogs.

## Teeth

Cow has flat teeth that are suitable for eating grass.

## What happens if ... ?

A cow's digestive system is not adapted to eat grass.

The cow will start for searching for another food source to survive.



Flat teeth of cow

## Adaptation of the digestive system of dog

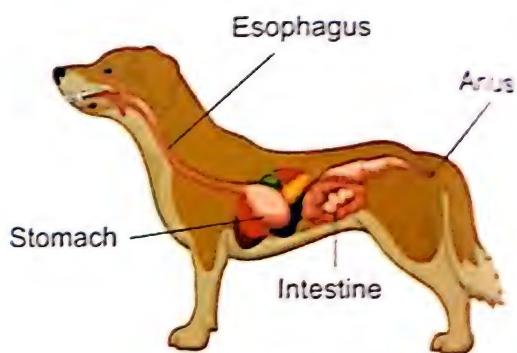
- Dog eats meat.
- Meat is much easier to be digested, so dog has a short digestive system and also some organs of its digestive system are adapted to digest this type of food such as :

## Stomach

Dog has only one stomach.

## Teeth

Dog has sharp teeth that are suitable for eating meat.



Sharp teeth of dog



## Check your understanding

### ► Complete :

Dogs have ..... teeth that are suitable for eating meat, while cows have ..... teeth that are suitable for eating grass.

### ► Give a reason for :

Cow has a long digestive system with four stomach-like organs.

### ► What happens if ... ?

One of the organs of the digestive system of dog is absent.

## Notes for parents

- Discuss with your child the adaptation of the digestive system of cow and dog.
- Let your child answer the question to check his/her understanding

## Activity 11

# Respiratory System

► Have you ever noticed that :

During sitting, your breath slows down



While

During running your breath quickens



- Like getting nutrients from food, getting oxygen gas from the air is a complex process that depends on many organs working together to get the needed energy.
- Any living organism respires to get oxygen gas which is necessary to burn the digested food to get the needed energy for all the body activities, so :
  - The respiratory system is the system responsible for breathing (respiration).
  - The respiratory system supplies the body with oxygen gas and gets rid of carbon dioxide gas through the respiration process.



## Respiration process :

It is a process of entering the air carrying oxygen into the body and pushing the air carrying carbon dioxide out of the body.

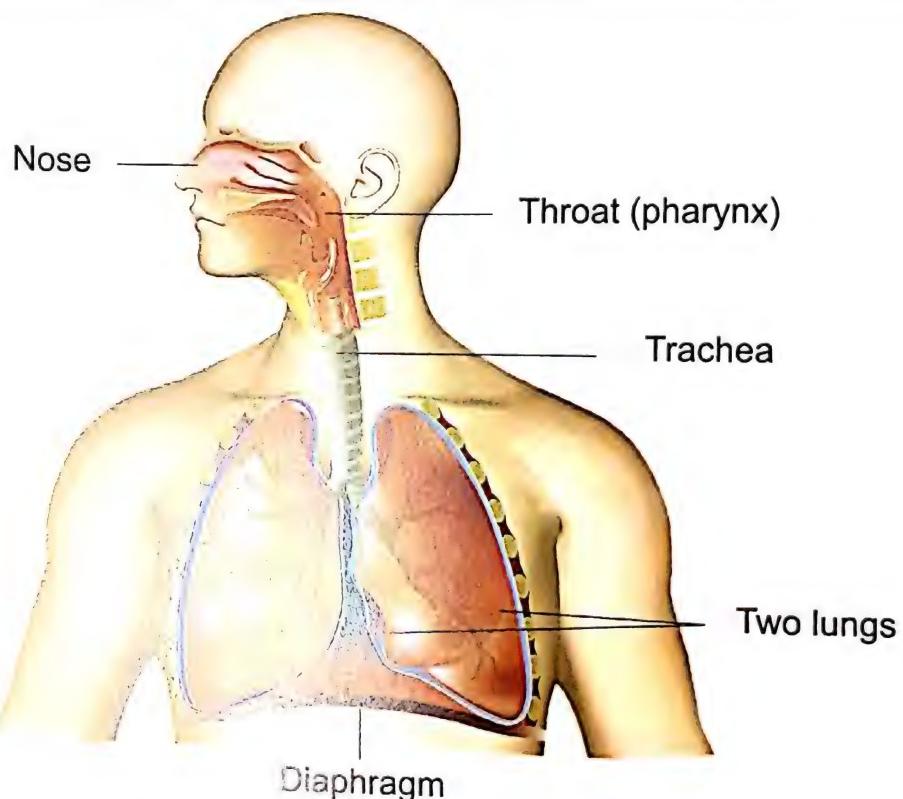
- Discuss with your child the relation between the digestive system and the respiratory system to obtain energy.

## Human respiratory system

The structure of the human respiratory system :

The human respiratory system consists of some organs

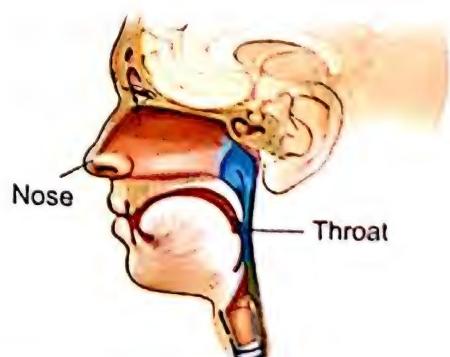
Nose      Throat (pharynx)      Trachea      Two lungs      Diaphragm



## The human respiratory system

How does the respiratory system work ?

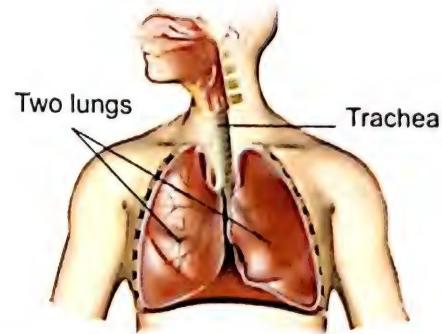
During breathing in (inhalation) , air enters through the **nose** and **mouth** then down the **throat**.



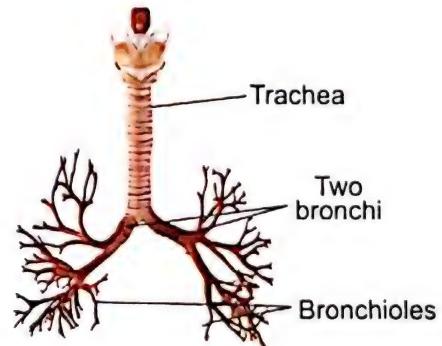
### Notes for parents

- Help your child to identify the organs of the respiratory system.

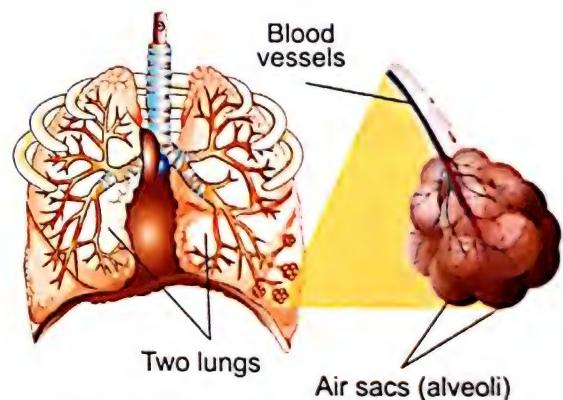
Then, the air passes through the trachea into the two lungs which fill up with air like two balloons.



Inside the lungs, the trachea is branched into two tubes known as "two bronchi" that in turn divided into smaller and smaller tubes that look like the branches of a tree known as "bronchioles".



- At the ends of these tubes there are little sacs surrounded by blood vessels known as "air sacs" or "alveoli" that extract oxygen gas from the air.
- Inside the blood vessels, oxygen moves into the blood stream, then it can be carried around the body to help other organs and systems to work.



### Notes

- Our bodies need oxygen in order to do their functions.
- We get oxygen gas from the air around us all the time.
- We cannot store extra oxygen in our bodies, so we must constantly take in new oxygen.

### Explain ?

#### How does the respiratory system get oxygen to the body cells ?

Oxygen enters the lungs during inhalation, then the blood transfers oxygen to all the body cells.

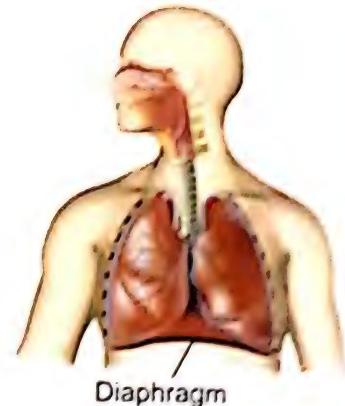
- Discuss with your child how the respiratory system works.

## How does the respiration process take place ?

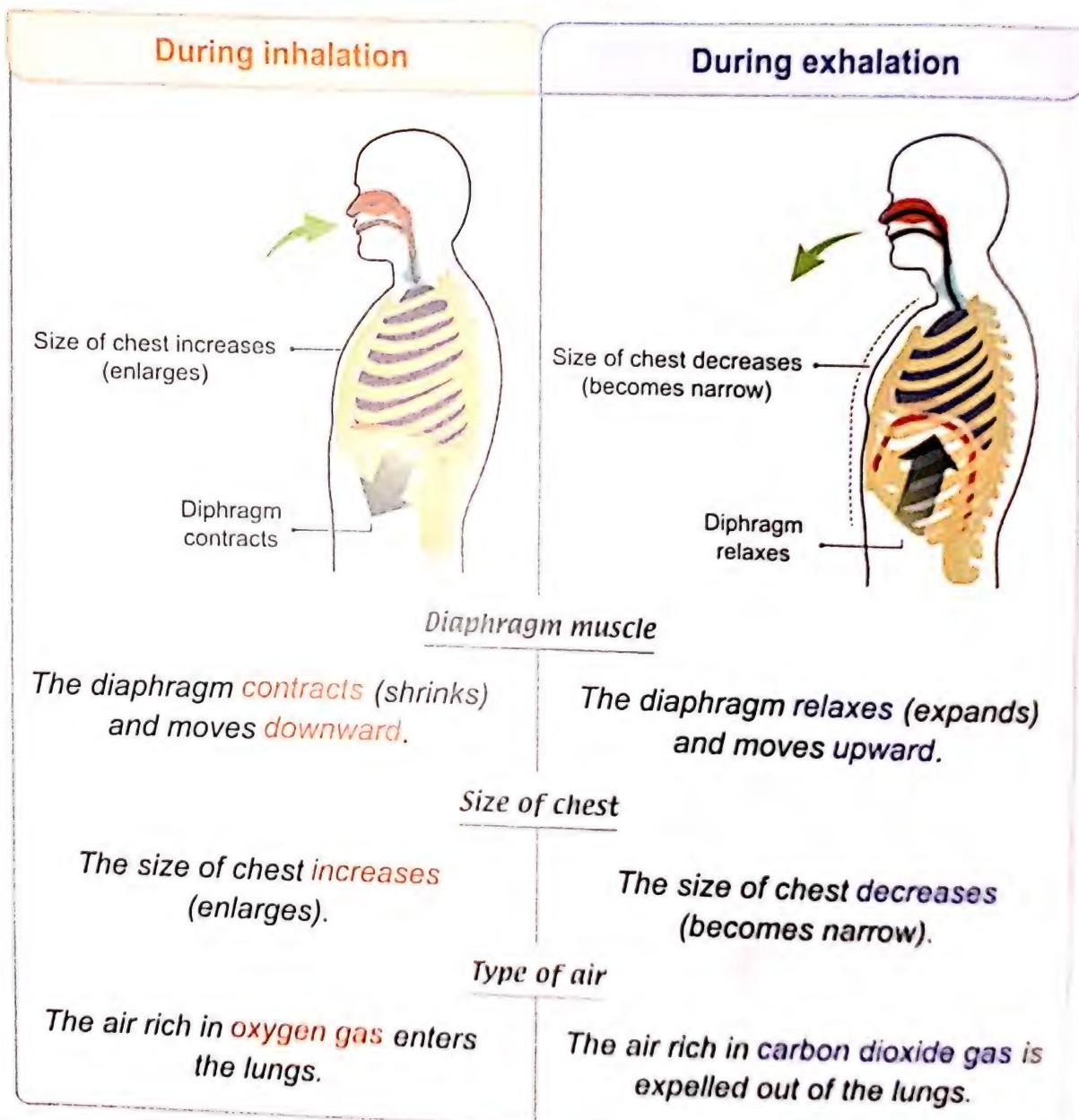
Respiration process includes :

1. Inhalation (breathe in).
2. Exhalation (breathe out).

Inhalation and exhalation are directed by a large muscle at the base of the ribs called the diaphragm.



Comparison between inhalation and exhalation :



### Notes for parents

- Discuss with your child how the respiration process takes place.

## Note

Carbon dioxide gas which is produced during respiration process is a waste product. This gas is harmful to our bodies so, we must expel it out during exhalation.



We can't hold our breath for a very long time.

Because we can't inhale oxygen and expel out carbon dioxide so, the body can't perform its vital processes.

## How can you keep the respiratory system healthy ?

- 1 Breathing clean air.



- 2 Eat fruits rich in vitamin (C) such as orange and guava.



- 3 Avoid smoking and smoking areas.



## Check your understanding

### ► Put (✓) or (✗) :

1. During inhalation, the diaphragm muscle relaxes and moves downward. ( )
2. Respiration process is the process by which the human obtains energy from burning of the digested food. ( )

### ► Complete the following statements :

1. Respiration process includes ..... and .....
2. Respiration process is a process of entering the air carrying ..... into the body and pushing the air carrying ..... out of the body.

### In the Exercises Book :

#### Try to answer :

- Exercises on Lesson 4 p. 24
- Self-Assessment 4

- Discuss with your child how we can keep the respiratory system healthy.

# Lesson 5

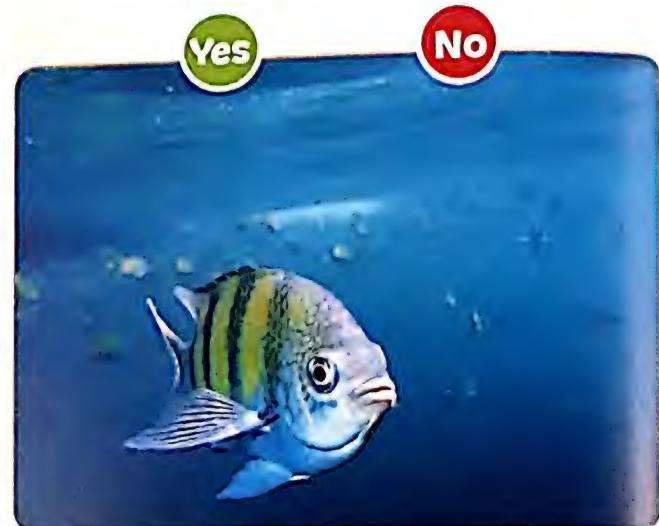
## Activity 12

### How Fish Breathe

- Can you stay and breathe under water all the time ?



- Can fish stay and breathe under water all the time ?



- Human can breathe and survive on land but not under the water, while fish can breathe and survive under water but not on land.

- Now, we will study how fish have adapted to live under water.

#### ► Adaptation of fish to breathe under water :

- Fish have gills to breathe instead of the lungs in human.
- Gills are found on the sides of a fish's head, under bony flaps that have the ability to open and close.
- Water enters the mouth of the fish and passes across the gills, then blood vessels in the gills carry oxygen gas to the rest of the body.
- Fish use gills to take oxygen gas out of the water and release carbon dioxide gas.
- So, gills are unique structural adaptations that allow fish to live and breathe under water.



#### Notes for parents

- Discuss with your child the adaptation of fish to breathe under water.

### Note

Water pollution impacts the fish that live nearby so, fish need clean water to survive, as we need to breathe clean air to stay healthy.



### Check your understanding

- Compare between the human respiratory system and the fish respiratory system using these words :

(carbon dioxide - blood - oxygen - air - lungs - water - gills)

Points of comparison	The human respiratory system	The fish respiratory system
Similarities :	- Inhale ..... gas. - Exhale ..... gas. - ..... carry oxygen gas to all the body parts.	
Differences :	- Humans have ..... to inhale oxygen gas from .....	- Fish have ..... to inhale oxygen gas from .....

- Put (✓) or (✗) :

1. The importance of gills to fish is like that of lungs to human. ( )
2. Oxygen gas reaches all the parts of the fish body through the blood vessels present in its gills. ( )
3. Carbon dioxide gas is harmful for both fish and human. ( )

- Let your child answer the questions to check his/her understanding

### Activity 13

## Humans Change the Environment

- You have studied multiple plant and animal adaptations to various environments.

### ► What happens as these environments continue to change ?

- If change occurs **slowly**, organisms have time to adapt over many generations.
- Human activity often rapidly changes ecosystems over days or years and these **rapid** changes can cause many organisms to move, disappear, die or even become extinct (extinct means that a living organism is no longer exist on Earth).
- Organisms are adapted to the ecosystems in which they live, however that ecosystem may change.

### ► Some of ecosystem changes are caused by the nature itself, such as :



Change in temperature.



The amount of rainfall from seasons.



Severe weather events,  
such as winds.



Wildfires and floods change the  
nature of plants that are available for  
food causing increases or decreases  
in predators and prey populations.

### Humans change the environment

### ► Now, we will study :

1. Evidence that human activity contributes to rapid changes in an ecosystem.
2. The impacts that human activities have on plants, animals and humans themselves.

### Notes for parents

- Discuss with your child some of the ecosystem changes that caused by the nature itself.

## 1 Evidence that human activity contributes to rapid changes in an ecosystem :

- Some of ecosystem changes are caused by the human activity, such as :

Cutting down forests.



Plowing grasslands.



Introducing plants, animals and diseases that were never part of the ecosystem.

The exhausts from cars and some factories cause air pollution.

Bad habits, such as throwing waste materials in waterways cause water pollution.



Watering the soil with polluted water causes soil pollution.

## 2 The impacts that human activities have on plants, animals and humans themselves :

- Plants and animals are affected by changes in an ecosystem caused by humans when air, water and soil get polluted, where :
  - Some animals can survive by moving to another ecosystem to find what they need.
  - Plants depend on their seeds to land in a better place for them to survive and grow.

- Discuss with your child the evidence that human activity contributes to rapid changes in an ecosystem.

• Humans are also affected by changes in an ecosystem, where :

- Air pollution (smog) makes the human hard to breathe.
- Water pollution makes the human hard to find clean drinking water.
- Air, water and soil pollution make the crops cannot grow.

**Note**

People who live in cities where air pollution is a big problem are forced to change their lifestyle on days when the pollution levels are dangerous, because exposure to high levels of air pollution over a long period of time can damage the lungs and cause asthma and heart problems.



**The role of human to help restore ecosystem :**

- As humans can cause harmful changes, they can help restore their ecosystems by :
- Replanting the cleared forests.
  - Removing the pollutants of air and water.
  - Preserving plants and animals in these ecosystems.

**Note**

Plants and animals that live in an ecosystem may have to change their behaviors in order to survive, this is due to the human activities that change the ecosystem. So, plants and animals may undergo structural and behavioral adaptations in response to change in the ecosystem.



**Check your understanding**

► Put (✓) or (✗) :

1. Wildfires and floods cause changes in some properties of an ecosystem. ( )
2. Water pollution affects fish, but doesn't affect humans and plants. ( )
3. Humans must keep air, water and soil clean. ( )

**Notes for parents**

- Discuss with your child the impacts that human activities have on plants, animals and humans themselves

## Activity 14

# Record Evidence Like A Scientist

You have learned a lot about how different types of adaptations help plants and animals survive.

In this activity, which will be repeated at the end of each concept, we will learn how to think like scientists to answer a question about one of the main points of this concept through four main steps :

- Step ① : The Question.
- Step ② : My Hypothesis (Claim).
- Step ③ : My Evidence.
- Step ④ : My Scientific Explanation.

### Step 1 The Question

How do different types of animals and plants adapt to survive in extreme climate ?

### Step 2 My Hypothesis (Claim)

Animals and plants have the ability to change their body structure and behaviors to adapt the extreme climate in their environment.

#### Note

Your hypothesis should be formed of a sentence that gives an answer for the previous question in step ①.

### Step 3 My Evidence

#### • Examples of structural adaptations :

- Some animals have thick fur to keep their bodies warm, while some other animals have extra-long ears to keep their bodies cool.
- Some plants have tiny leaves to hold in water.

#### • Examples of behavioral adaptations :

- Some animals stay in burrows to keep their bodies warm or cool.

#### Note

You should mention enough and suitable evidence that support your hypothesis.

- Help your child to think like a scientist by answering a question about one of the main points of this concept then write his/her hypothesis and evidence



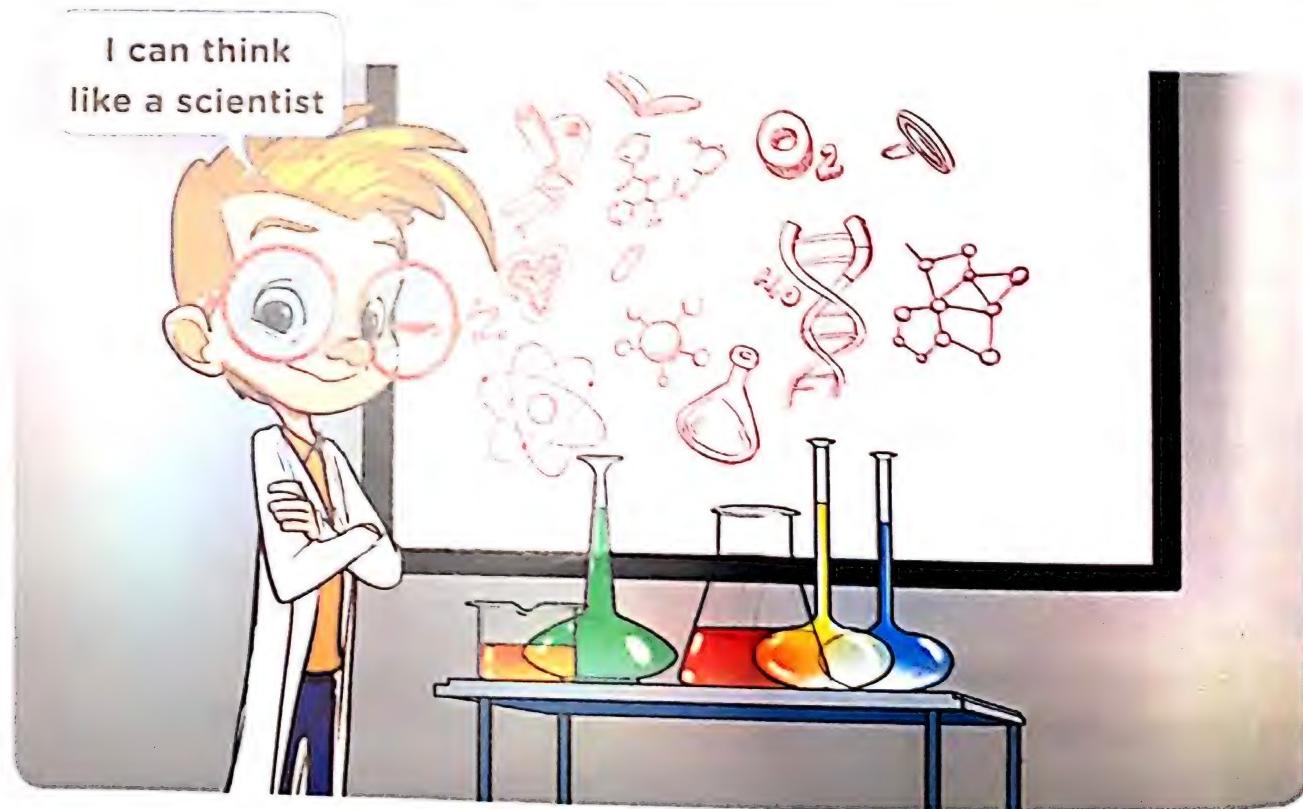
## Step 4 My Scientific Explanation

Animals and plants can survive in extreme climate through structural and behavioral adaptations, where :

- The structural adaptation in the polar bears that have thick fur and penguins that have a layer of fat to adapt the cold climate in polar regions.
- The structural adaptation in fennec foxes that have extra-long ears and also the behavioral adaptation as they stay in burrows to adapt the hot climate in desert regions.
- The structural adaptation in acacia trees that have tiny leaves to hold in water to adapt hot climate in savannah regions.

### Note

Your scientific explanation should explain your hypothesis and evidence introducing some supportive examples from what you have learned.



In the Exercises Book :

Try to answer :

- Exercises on Lesson 5 p. 33
- Self-Assessment 5

### Notes for parents

- Help your child to think like a scientist by writing his/her scientific explanations as the final step.

► Observe these pictures, then put  or  in front of each of the following sentences :



- Frogs, humans and fish have the same organs to take in oxygen from air or water. ( )
- Humans, frogs and fish all can live on land. ( )

### Careers and adaptation

- Scientists can learn how different organisms adapt to their environments through researches and use this knowledge to help **endangered species** survive.
- Amphibians are one of the most amazing living organisms on Earth.
- **Now**, let's study some facts about amphibians.

### Amphibians

- They are small animals such as :

Frogs



Toads



Salamanders



- They can live in moist environments like rainforests, stream and ponds.
- They need water as humans to survive but in a different way.
- Like humans, adult amphibians can breathe using lungs when they are on land, but they can also take in oxygen from water.

- Let your child determine a problem that occurs in the environment and choose the best solution for this problem.

## How amphibians get oxygen from water ?

- Amphibians are covered with skin that allows water and gases to pass through.
- Water surrounds the skin of amphibians, making their skin moist, so they can absorb (extract) oxygen directly from water.
- This structural adaptation makes amphibians well-suited to live in wet environments.



Golden frog

## The role of scientists to protect many types of frogs from extinction

- Frogs need clean water to stay healthy because they are very sensitive to the effects of :
  - Water and air pollution.
  - Destroying the natural environment.
  - Viruses that can travel through water.
- Scientists are working to save many types of amphibians from extinction like golden frogs in rainforests by studying :
  - How these animals interact with their environments.
  - What make these animals sick in their environments.
  - The reasons of the disappearance of these animals around the world at frightening rates.

### Note

Ninety species of amphibians have become extinct in the last 20 years in addition to 124 other endangered species.

### Notes for parents

- Let your child think about what scientists can do to protect many types of frogs from extinction.

## Protection (Advocate) of amphibians from extinction

Biologists have a great role in protecting amphibians from extinction. Although, all people should think about how to protect amphibians from extinction as follows :

### For biologists

Understanding how amphibians breathe in air and water helps scientists search for pollution factors that threaten them in air and water.

### For people

Clean air and water is important for amphibians, so people should :

- Avoid throwing waste materials in water.
- Dispose of chemicals in a correct way helps to avoid water pollution.



### Check your understanding

► In your opinion, which of these sentences is correct and which one is incorrect to protect amphibians from pollution that may cause extinction.

The sentences	correct (✓)	incorrect (✗)
• Cutting down trees to use their wood to make furniture.		
• Throwing chemicals into the water.		
• Operating factories in proper ways to decrease the amount of smog.		
• Avoid throwing wastes into the water.		

In the Exercises Book :

Try to answer :

- Exercises on Lesson (6) p. 39
- Self-Assessment (6)
- Model Exam on Concept (1.1)

- Let your child answer the question to check his/her understanding.

## Activity (16)

# Review : Adaptation and Survival

- We can summarize this concept in the following main points :

### Adaptation :

It is a characteristic of living organisms that allows them to change over generations and helps them to survive and reproduce in the ecosystem.

### **Types of adaptation**

#### **1. Structural adaptation :**

It is a change in the structure of the animal's body to adapt its environment.

**Example :** The blood vessels in the penguin's feet.

#### **2. Behavioral adaptation :**

It is a change in the behaviors or acts of a group of animals to adapt its environment.

**Example :** Desert lizard looks for shade during hot sunny days.

### Camouflage :

It is an example of adaptation in which some animals hide from their predators or their preys by hiding in different environments.

**Examples** of some animals that make adaptation to survive in their environments through camouflage :

- 1. Polar bear.
- 2. Brown bear and dark bear.
- 3. Caracal and fennec fox.
- 4. Some types of lizards.

### **Plants can make adaptation to survive in their environments such as :**

- Acacia tree in savannah forest has a very long taproot that grows directly downward to search for water below the soil surface.
- Kapok tree in Amazon rainforest of Brazil has buttress roots that are not planted deeply in the ground, but they grow high up on its trunk to hold the tree firmly in the soggy soil.

### Digestive system :

It is the system responsible for breaking down food into small parts to enable the body cells to use them in getting energy.

- Digestive system is adapted to meet the needs of living organisms according to the type of food that they eat.

### **Notes for parents**

- Help your child review the main points in this concept

**Digestive system of human consists of :**

- |                     |                     |             |
|---------------------|---------------------|-------------|
| 1. Mouth.           | 2. Esophagus.       | 3. Stomach. |
| 4. Small intestine. | 5. Large intestine. |             |

**Digestive system of dogs and cows consists of :**

- |             |                |
|-------------|----------------|
| 1. Mouth.   | 2. Esophagus.  |
| 3. Stomach. | 4. Intestines. |
- Cows eat grass, while dogs eat meat.
  - Digestive system of a cow has four stomach-like organs, while that of a dog has one stomach.
  - Cow has flat teeth, while dog has sharp teeth.

**Digestion process :**

It is the process of breaking down food and changing it into chemical substances that the body absorbs and uses them in getting energy and growth.

- 
- **Respiratory system** is the system responsible for breathing.

**Respiratory system of human consists of :**

- |               |                      |             |
|---------------|----------------------|-------------|
| 1. Nose.      | 2. Throat (pharynx). | 3. Trachea. |
| 4. Two lungs. | 5. Diaphragm.        |             |

**Respiration process :**

It is a process of entering the air carrying oxygen into the body and pushing the air carrying carbon dioxide out of the body.

**Respiration process includes :**

- |                |                |
|----------------|----------------|
| 1. Inhalation. | 2. Exhalation. |
|----------------|----------------|
- Living organisms breathe in oxygen gas and breathe out carbon dioxide gas.
  - Humans have lungs to inhale oxygen gas from air to adapt to live on land.
  - Fish have gills to inhale oxygen gas from water to adapt to live underwater.
  - Amphibians respire through lungs and skin to adapt to live on land and in water.
  - We have to keep air, water and soil clear, in order to protect living organisms from extinction.

**Concept  
1.2**

**Senses at Work**





## Learning outcomes

By the end of this concept, your child will be able to :

- Develop models illustrating how animals receive, process and react to information in their environments.
- Explain how organs and systems work together to process and respond to the senses.
- Plan and carry out investigations to produce evidence that the senses play a role in reaction time.



## Key vocabulary

- |               |             |          |          |
|---------------|-------------|----------|----------|
| • Brain       | • Receptors | • Ear    | • Reflex |
| • Environment | • Senses    | • Heart  | • Sound  |
| • Information | • Stimuli   | • Nerves | • Tongue |

# Can You Explain?



Human



Owl



Dog



Egyptian mongoose

## Activity 2

# Dolphin Super Senses

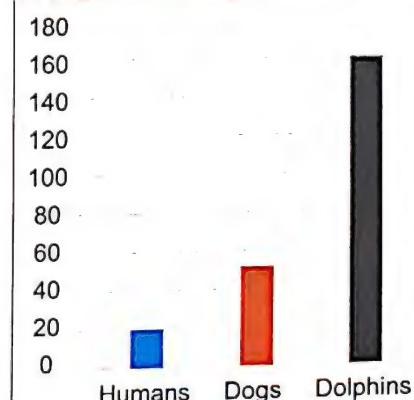
- - Hearing is one of the most important senses for all of us.
- Our sense of hearing allows us to gather information about the world around us.
- Look at the opposite graph, and then answer the following question:

Do the living organisms in the graph have similar hearing senses?

**Yes**

**No**

Strength of hearing



- Dolphins have super senses that help them:
  - survive.
  - search for food.
  - protect themselves under water.
- The most sharp sense that dolphins have is the **sense of hearing**, since they can hear all sound tones.

## How can dolphins locate organisms and other things under water ?

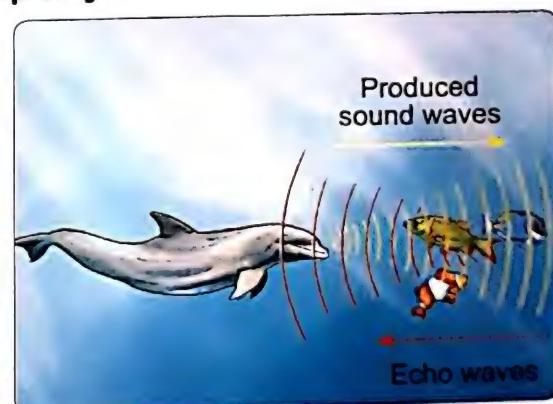
- Dolphins use a property known as "echolocation" that depends on "echo" to detect the location of other living organisms and objects in the water.

### Echo:

It is the reflection (bouncing off) of sound waves back from a solid surface to its source.

### ► Let's see how dolphin use echolocation property :

1. Sound produced by dolphins travels in the form of waves called sound waves.
2. These waves travel through water, and when they hit objects, they bounce back to dolphins in the form of echo.
3. Echo helps dolphins locate their preys.



## Check your understanding

### ► Put (✓) or (✗):

1. Smell is one of the super senses of dolphins.
2. Echo helps dolphins locate their preys.

(      )

(      )

- Discuss with your child how dolphins use the echolocation property to locate their preys and other objects under water.

### Activity 3

## Using our Five Senses

► Look at the following pictures, then write under each picture the sense that helps each person collects information from the surrounding environment

Using the word bank below (You can write more than one sense under each picture).

**Word bank** Hearing – Sight – Taste – Smell – Touch

1 Watching TV



2 Eating Pizza



3 Listening to music



4 Holding a piece of ice



### Notes for parents

- Help your child to write the sense which is responsible for each activity shown in the pictures.

#### Activity 4

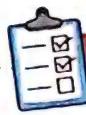
## What Do You Already Know About Senses at Work ?

### ► Animals perceptions :

- You have previously known that animals have senses like those of humans, and each animal can use more than one sense for more than one purpose to be able to adapt to its habitat, as illustrated by the following examples :

Animal	Purpose	Sense	Example
 Fox	Avoiding danger	Hearing – Sight	A fox uses its eyes and ears to runaway from its enemies, when seeing or hearing them.
 Chameleon	Searching for food	Sight – Taste	A chameleon uses its eyes and tongue to see and taste its food.
 Dog	Recognizing friends	Smell – Sight	By smelling human scent.
 Monkey	Identifying things	Touch – Smell – Sight – Taste – Hearing	A monkey uses its five senses to distinguish between things it eats or risks it faces.

- Discuss with your child that animals can use more than one sense for more than one purpose.



## Check your understanding

- Fill in the following table using the information you have learnt from the previous table (you can write more than one sense).

Animal	Purpose	Sense
	Searching for food	.....
	Avoiding danger	.....
	Recognizing its friends	.....

In the Exercises Book :

Try to answer :

- Exercises on Lesson ① p. 48
- Self-Assessment ⑦

### Notes for parents

- Let your child answer the questions to check his/her understanding

## Super Sensory Organs

► Look at the following pictures and then answer the opposite questions :

- Can a human see everything clearly inside a dark room?



- Can an owl see its prey in the dark during nighttime ?



► Have you ever had trouble seeing at night ?

- You can hear the noise of something small moving through the darkness, but you cannot see it clearly to.
- Some animals can look for their food at night using their super senses, these animals that become active at night are known as " **Nocturnal Animals** ".

► Why some animals become active at night ?

1. In extremely hot regions, the perfect time to look for food is during the nighttime, when the weather becomes cool enough.
2. Some animals hunt at night, because their preys are available at night only.
3. Some animals depend on total darkness to hide from their preys and surprise them.

► How can nocturnal animals hunt at night without the need of light ?

- The super sensory adaptations of nocturnal animals allow them to navigate and search for food safely in the dark, as shown in the following examples :

- Discuss with your child why nocturnal animals are active during the nighttime

## 1. Snake Super Sensory Adaptations :

Snakes cannot see at night, but they have the ability to sense heat using a special body part in their faces.

### Purpose :

To locate their preys at night through sensing their body heat.



## 2. Bat Super Sensory Adaptations :

Bats cannot see very well in the dark, but they are able to use echolocation property (like dolphins) using sound waves to find their food in the dark using their hearing sense.

### Purpose :

To locate their preys (as insects) and other bodies in their surroundings in the dark using the echo.



## 3. Owl Super Sensory Adaptations

- Owls have both extraordinary eyesight and hearing.
- The bowl-shaped faces and feathers in owls' heads help them detect, amplify and direct distant sounds directly into their ears.
- When animals making the noise are hiding within grass or under snow, the strong hearing sense of the owl allow it to detect their slight and faraway movements.
- Owls can rotate their heads in all directions, so that they can search for preys everywhere.



### Purpose :

To detect the movements and sounds of tiny faraway preys.



## Check your understanding

### ► Give a reason for :

- Bats can catch insects during the night.

### Notes for parents

- Discuss with your child how some nocturnal animals can hunt their preys in the dark during the nighttime.

## Activity 6

# The Nervous System

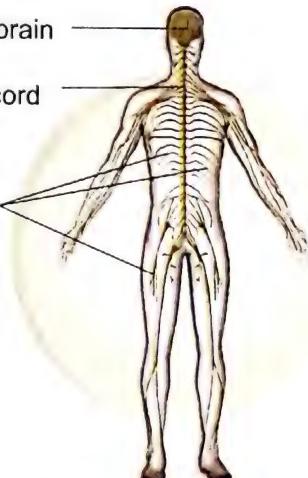
### ► How do humans use their senses to gather information from their surroundings ?

- There is integrity between the five senses of the human body and the nervous system, such that these senses are considered a part of the nervous system, and they work integrally with the other body systems.
- Mammals such as human, elephant and dog have the same structure of nervous system.

### The nervous system consist of :

#### 1 Brain :

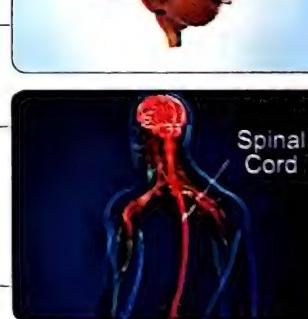
The main control center of the body.



Human nervous systems

#### 2 Spinal cord :

Carries messages from the brain to the body and from the body to the brain.



#### 3 Nerves :

Carry messages from the brain to the spinal cord and other parts of the body, as well as from other parts of the body to the spinal cord and the brain.



### How do information from the senses reach the brain to be processed ?

- The brain is connected to a group of nerves known as **the spinal cord** that passes through the backbone.
- The spinal cord branches to smaller and smaller nerves which are distributed throughout all parts of the body.
- Some of these nerves are directly connected to the brain, such as the nerves of **the eyes and the heart**.

- Discuss with your child the structure of the nervous system in mammals.
- Explain to your child that mammals are the animals that give birth and don't lay eggs.

- The sensory organs ( eyes – nose – ears – tongue – skin ) receive information from the environment.
- The nerves spread across the whole body connect the sensory organs with the brain.
- The nerves transmit information from the sensory organs to the brain in the form of **electrical impulses**.

### **Note**

The sensory organs (eyes – ears – nose – tongue – skin) contain a special type of nerves known as **sensory receptors**.

#### Sensory receptors :

They are nerves found in different places of the body, and they are responsible for receiving information from the surroundings.

#### The nervous system and pizza

- How does the human body respond to an external stimulus like the smell of pizza?

Whenever you smell something such as pizza, you receive that information through the sensory receptors in your nose.



Then the sensory receptors of smell that are found in the back of your nose send a specific signals along the nerves to your brain. These signals are in the form of electrical impulses.

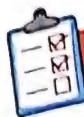
Once the smell information reaches your brain, it is processed by the brain to produce the proper response, such as determining the type of the food.

### **Note**

The memory in your brain plays a role in responding to the pizza smell, whereas the memory sends signals clarifying that the pizza smell is related to food.

#### Notes for parents

- Explain to your child how the nervous system works.



## Check your understanding

### ► Choose the correct answer :

- Imagine that you are touching an ice cube with your finger, do you know where the information is processed to tell you that it is cold ?
- a. In your finger.
- b. Hand.
- c. Nerve.
- d. Brain.
- e. Spinal cord.

### ► Complete :

1. The nervous system of mammals is composed of ..... and .....
2. Nerves of ..... and ..... are considered examples of the nerves directly connected to the brain.
3. The spinal cord passes through .....



### Optional Digital Activity

Activity (7) " Processing Sensory Information " in the school book is an optional digital activity. You can do this activity by scanning its QR code found in your school book.

In the Exercises Book :

Try to answer :

- Exercises on Lesson ② p. 50
- Self-Assessment ⑧

• Let your child answer the questions to check his/her understanding.

# Lesson 3

## Activity 8

# Sensing of the Environment

► Look at the following pictures, then choose the correct answer :



- When your hand touches the spines of a cactus plant, it is quickly withdrawn in less than one second.

- When this small animal hears a snake moving nearby, it jumps quickly in less than one second.

- Which system in the human and animal bodies do you expect is responsible for movement in such situations?  
 a. Respiratory system.       b. Nervous system.       c. Digestive system.

### Avoiding danger in humans and animals :

- The different parts of the nervous system (sensory receptors, nerves, spinal cord and brain) are responsible for sensation and delivering messages.
- In human the reason for a response of danger is different from the reason for a response of danger in animals, where :
  - Humans do not have to run away from dangerous wild animals, meanwhile the human body responds by quickly moving away from the threat for safety.
  - Animals searching for food could mean the fear of being a prey to other animals, that is why all their senses and body systems are working integrally for an effective adaptation to the environment, so that they can survive.

### Notes for parents

- Discuss with your child the difference between humans and animals in avoiding danger.

## **Jumping Jerboa :**

The Egyptian jerboa is a species of desert rodents. It is a tiny animal with very large ears, small eyes and long hind legs.



## **Adaptation to the Environment :**

- The Egyptian jerboa has **long hind legs** to help it jump long distances.
- A jerboa's **feet and toes have hair** to help it catch sand when it jumps. It hops in zigzag paths to be able to run away quickly from danger.
- A jerboa has **large ears**, so that it can hear snakes, even if they are small.

### **► How do all parts of a jerboa's body work together to avoid danger?**

#### **When snakes make noise as they approach a jerboa :**

**1** The sensory receptors in a jerboa's ears send a message through a network of nerves to the brain.



**2** The jerboa's brain then translates this message and responds by alerting its legs to start moving.



**3** The jerboa's strong hopping legs starts to jump away from the danger in zigzag paths .

#### **- The above explanation shows that what helps a jerboa to survive are:**

The way its senses work (e.g.: sharp hearing), the structure of its adaptive body (strong hopping hind legs), and the integration of all previous with its nervous system.

**- In the above example**, the whole response process of a jerboa running away from danger occurs in less than one second. The time taken by a jerboa to react to danger is known as the "reaction time".

#### **Reaction time :**

It is the time taken by an organism's body to react to different stimuli around it.

- Explain to your child how the jumping jerboa avoid danger with the help of its nervous system.



## Check your understanding

### ► Based on your understanding of the activity:

- Clarify the super senses that were most helpful for a jerboa in sensing danger.

### ► Put (✓) or (✗):

1. When a jerboa feels unsafe, its brain sends messages to its legs through its nervous system to run away from danger. ( )
2. The reaction time is the time taken by a jerboa to respond to danger. ( )
3. Jerboa's hind legs are short to help it jump long distances. ( )



## Optional Digital Activity

Activity (9) "Nerves" in the school book is an optional digital activity. You can do this activity by scanning its QR code found in your school book.

In the Exercises Book :

Try to answer :

- Exercises on Lesson ③ p. 57
- Self-Assessment ⑨

## Notes for parents

- Let your child answer the questions to check his/her understanding.

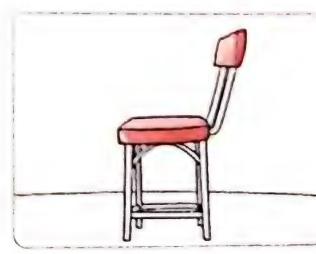
## Reaction Time

- You have previously read about the importance of reaction time for animals like the jerboa.
- In this experiment, we are going to study the reaction times for auditory and visual stimuli to catch a stick that has fallen to the ground.
- In the first part of the experiment, you will use the sense of sight to see where the stick has fallen.
- In the second part of the experiment, you will use the sense of hearing to hear the sound from which you know that the stick has fallen.

### ► Tools used



Stick



Chair



Stopwatch

### ► Steps

- One of your friends stands on a chair holding the tip of the stick, while another friend sits on the floor, such that his hand is near the end of the stick without touching it.
- The first friend drops the stick, and the other friend will try to catch it as fast as he can, depending on his sense of sight.
- Calculate the reaction time taken to catch the stick using the stopwatch.
- Repeat the above steps three more times, given that the stick must be at the same height from the floor.
- Write down your notes in a table, and then draw a circle around the average reaction time.
- Repeat the previous steps three times, while his eyes are closed and depending on his sense of hearing, such that the person holding the stick should say the word "go" when he releases the stick, record your notes in another table, and then draw a circle around the average reaction time.



- Let your child apply this experiment to understand the meaning of reaction time.
- Discuss with your child that the brain can process what we see faster than what we hear.

## ► Observation

Data table of the first part of the experiment Relying on the sense of sight.

Distance	Trial	Reaction Time
1 m	1	3 seconds
1 m	2	② seconds
1 m	3	1 second

Date table of the second part of the experiment Relying on the sense of hearing.

Distance	Trial	Reaction Time
1 m	1	4 seconds
1 m	2	③ seconds
1 m	3	2 seconds

## ► General Conclusion

• In the first part of the experiment :	When the eyes saw the stick falling, they sent a signal to the brain through the nerves. The brain processed the information and transmitted a message to the hand muscles in order to catch the stick.
• In the second part of the experiment :	When the ears heard the voice "go", they sent a signal to the brain through the nerves. The brain processed the information, and then transmitted a message, so that the hand muscles respond and catch the stick.
• You could catch the ruler faster when you saw it fall, because the brain can process what you see faster than what you hear.	



## Check your understanding

► Put (✓) in front of the situations that illustrate the importance of reaction time :

1. You move your hands away from touching a very hot object . ( )
2. You blink your eyes when something comes near it. ( )
3. You fall while playing football. ( )

### Notes for parents

- Discuss with your child that, in any experiment, conducting more trials will help him/her increase the accuracy of the results.

In the Exercises Book :

Try to answer :

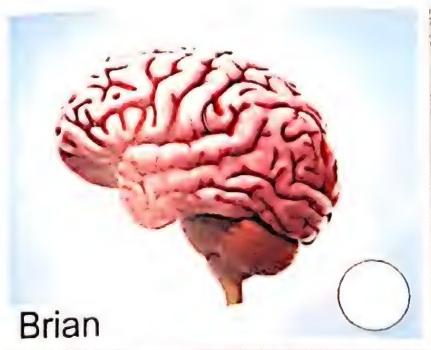
- Exercises on Lesson ④ p. 61
- Self-Assessment ⑩

# Lesson 5

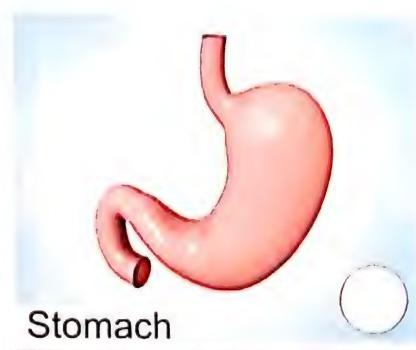
## Activity 11

### How the Nervous System Works

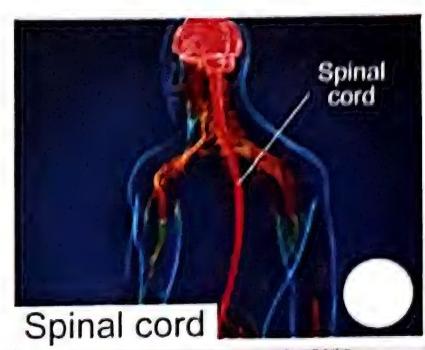
► Look at the following pictures, then put (✓) in front of the picture that represents a part of the nervous system.



Brian



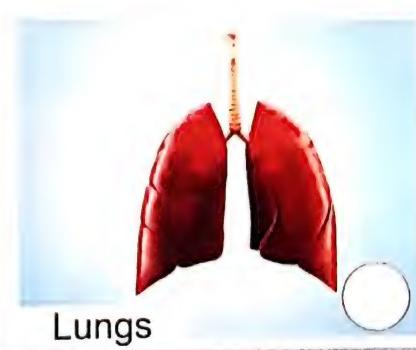
Stomach



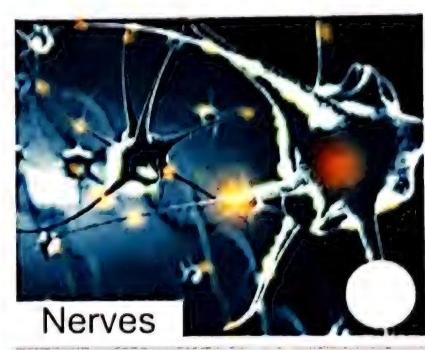
Spinal cord



Large intestine



Lungs



Nerves

#### Functions of the nervous system

1. Collecting information about what happens inside and outside the body then sends these information to the brain.
2. Understanding what this information means.
3. According to this information, a signal is sent to the body telling it what to do.

► What role do the senses of a living organism play in processing information?

- The sensory organs like the eyes, ears and skin, are responsible for gathering information.
- The nervous system sends this information from the sensory organs to the brain through the nerves to be processed and interpreted.

#### Note

The components of the nervous system are connected together to the nerves that transmit information throughout the body parts.

- Discuss with your child the functions of the nervous system.

### Example:

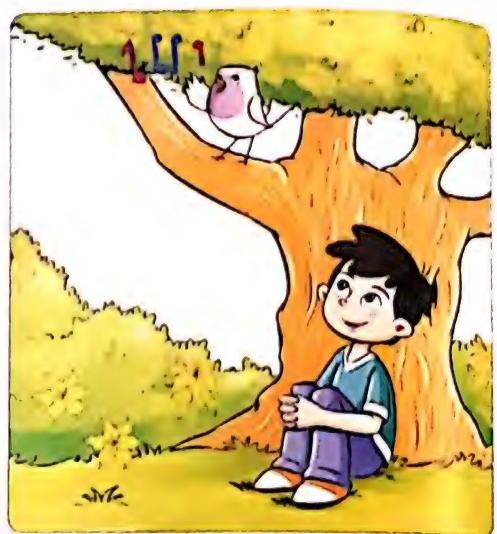
When your ears hear the bird chirping (sound waves).



Your ears send a message through the nerves to the brain which processes these sound waves.



Then, the brain sends a signal to the body to tell it what to do, such as turning around to search for the bird on a tree.



### Notes

- Some messages, which are called reflex actions, are so fast that you cannot realise it.
- Other messages are sent from and to the brain automatically, like the signal to breathe.



### Check your understanding

#### ► Complete the following sentences :

1. The components of the nervous system are connected to each other by .....
2. The sensory organs like ....., ..... are responsible for gathering information.
3. The nervous system sends information via ..... to ..... to be processed.
4. Collecting information about what happens inside and outside the body is one of the functions of the ..... system.

### Notes for parents

- Let your child answer the questions to check his/her understanding.

## Activity 12

# Describing the Nervous System

► From the previous activity, we conclude that:

- The parts of the nervous system work together to perceive our surroundings and interpret information in order to take the right action, and then transfer signals to the body to respond to different stimuli.
- A person cannot receive, send or respond to information without the presence of all parts of the nervous system together. In other words, every part of the nervous system cannot work individually.



## Check your understanding

► Complete the following sentences using these words :

brain – nervous system – reaction time – nerves – spinal cord  
– electrical impulses – sensory receptors.

1. The brain is a part of the .....
2. The bundle of nerves passing through the backbone is called the .....
3. The nerves transmit information from the sensory organs to the brain in the form of .....
4. The ..... is the time taken by an organism's body to respond to different stimuli around it.
5. The ..... is considered the main control center of the body.
6. The ..... are the nerves that lie in different places of the body and are responsible for receiving information from the environment.
7. The ..... carry messages from the brain to the spinal cord and other parts of the body.



## Optional Digital Activity

Activity (13) "Your nervous system" in the school book is an optional digital activity.  
You can do this activity by scanning its QR code found in your school book.

In the Exercises Book :

Try to answer

- Exercises on Lesson 5 p. 65
- Self-Assessment 11
- Model Exam on Concept (1.2)

\* Let your child answer the questions to check his/her understanding

# Lesson 6

## Activity 14

### Record Evidence Like A Scientist

You have learnt a lot about how the nervous system and the senses work together.

- Now, you are going to learn how to think like a scientist to answer a question about one of the main points of this concept through the four steps you have learnt in the previous concept.

► Complete the following steps using these words below :

brain – information – nervous – skin – echo – adapt –  
sensory organs – ears – electrical impulses – nerves – nose.



#### Step 1 The Question

How do animals receive and respond to stimuli in their habitat?

#### Step 2 My Hypothesis (Claim)

Animals use their ..... system to receive and process information.

#### Step 3 My Evidence

The ..... must transmit the information from the ..... to the ..... to be processed and perceived, since our senses cannot process information without the nervous system.

#### Step 4 My Scientific Explanation

- The nervous system of animals receives, transmits and processes .....
- Animals have sensory organs just as humans, including the eyes, ..... , tongue and .....
- When animals receive information from their habitat, it is transmitted to the nerves in the form of .....
- A signal is sent to the brain, which then sends signals to other parts of the body to respond.
- Dolphins and bats get food by identifying the prey location using the .....
- The sensory organs help animals ..... and survive in their habitats, since if they do not have these organs, they cannot survive.



#### Optional Digital Activity

Activity (15) "Become a neuroscientist" in the school book is an optional digital activity. You can do this activity by scanning its QR code in your school book.

#### Notes for parents

- Help your child to complete the steps to think like a scientist by answering a question about one the main points of this concept.

## Activity 16

# Review : The Senses at Work

► We can summarise this concept in the following main points :

- Some animals have sharp senses to help them adapt to their habitats and survive.
- The sharpest sense in dolphins is hearing, so that a dolphin can locate its preys by using echolocation (echo).
- Some animals can look for food during the nighttime using their super senses. Such animals are called “**Nocturnal Animals**”.

Examples of nocturnal animals :

- **A snake**: has the ability to sense the heat of its prey's body.
- **A bat** : has the ability to use echolocation to locate its preys and other different objects in the dark by hearing.
- **An owl** : - has extraordinary acute eyesight and hearing.
  - The bowl-shaped faces and feathers in owls' heads help them detect, amplify and direct distant sounds directly into their ears.
  - Owls can rotate their heads in all directions, so that they can search for preys everywhere.

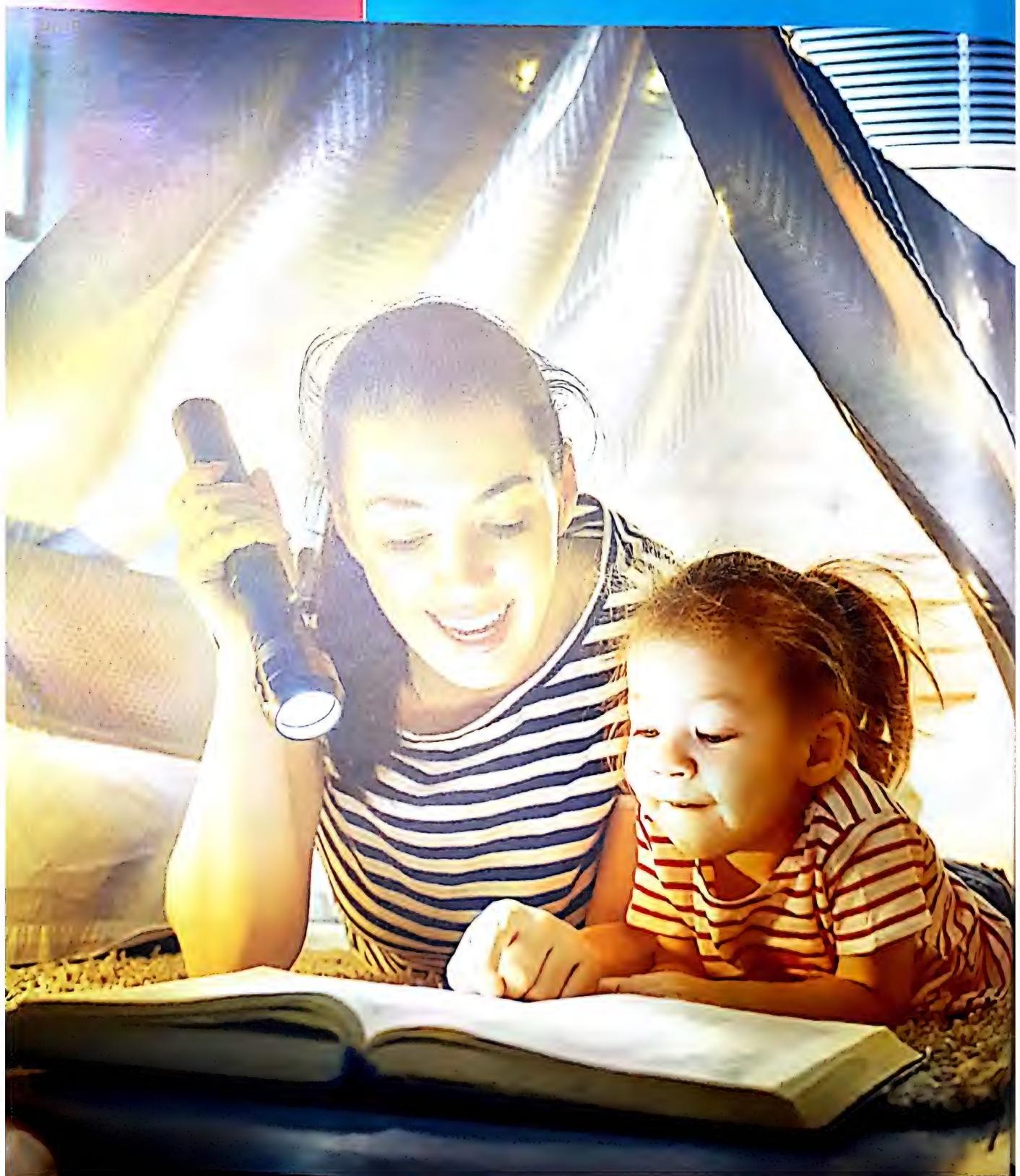
- 
- **The nervous system consists of**: the brain, spinal cord and nerves.
  - **The sensory receptors**: nerves that lie in different places of the body, and are responsible for receiving information from the environment.
  - **The Egyptian jerboa**: is a rodent that has large ears (sharp hearing), small eyes and long hind legs.
  - **The reaction time**: is the time taken by an organism's body to react to different stimuli around it.
    - The reaction time varies based on the sense used, such that using our eyesight helps us catch things faster than using our hearing.

### Functions of the Nervous System

1. Collecting information about what happens inside and outside the body.
  2. Understanding what this information means.
  3. According to this information, a signal is sent to the body telling it what to do.
    - The nervous system sends this information from the sensory organs to the brain through the nerves to be processed and interpreted.
- Help your child review the main points in this concept.

# Concept 1.3

## Light and Sight





## Learning outcomes

By the end of this concept, your child will be able to :

- Describe how light transfers energy across distances.
- Develop a model that describes how the behavior of light enables the eye to see objects.
- Explain how adaptations help some animals gather information in the dark.



## Key Vocabulary

- |           |           |               |          |
|-----------|-----------|---------------|----------|
| • Feature | • Light   | • Matter      | • Opaque |
| • Pupil   | • Reflect | • Transparent |          |

# Can You Explain?



Fishing cat



Human



Tarsier monkey

- In the previous concept, you have learnt that animals have senses like humans.
  - Some animals have some super sensory adaptations to survive.
  - Humans and animals have a nervous system that sends information from the sense organs to the brain through the nerves for processing and preception.
- Do you know what is the organ that is affected by light in humans and animals and how they can see things in low-light places ?
- **The eye** is the organ of sight that is affected by light in humans and animals.
  - **Humans** cannot see in the dark, but they need light to gather information about what is happening around them.
  - **Some animals** have a spectacular night vision, which enables them to see at night such as :
    - **Fishing cat** has a special eye structure that helps it to find its prey in the dark.
    - **Tarsier monkey** has huge eyes that can see almost everything in the dark.

## Notes for parents

- Discuss with your child how humans and animals see things in low light places.

► From the previous explanation, we conclude that :

- Some nocturnal animals can see better than humans in the dark.
- Living organisms can obtain light from many sources, such as :



The Sun



Candles



Electric lamps

► In this chapter, we will study :

- Some animals that can hunt in the dark.
- Some special structures of eyes for some animals.
- Light is a source of energy.
- The reflection of light.
- How we can see different objects around us.

• Let your child think about other sources of light

## Activity (2)

# Hunting with Night Vision

► Look at these pictures, then put (✓) or (✗) in front of the sentences below:



Human



Cat

- Human can see clearly in an area with low light. ( )
- Cat can see clearly in an area with low light. ( )

## Vision in humans and animals

- Humans use the sense of sight to gather information about what is happening around them. To see well, humans eyes need **light** but in the absence of light, human eye would need **a night vision goggle** to see in the dark.
- There are some animals that have a structural adaptation in their eyes, which helps them see at night during the dark to hunt their preys, such as the **fishing cat**.



Night vision goggle

### The fishing cat

It is a wild cat that hunts during the nighttime, as the structure of its eyes helps it to find its prey in the dark.

#### • Its structural adaptation :

**The fishing cat's eyes seem to glow in the dark and that's because :**

- They have a mirror-like membrane on the back of their eyes.



Fishing cat

### Notes for parents

- Discuss with your child the structural adaptation of the fishing cat's eyes.

- When light enters its eyes, it bounces off this membrane, allowing the eye to collect more available light, and this causes the cat's eye to appear bright.
- This adaptation allows cats to have excellent night vision that they use to hunt successfully in the dark.

 **Note**

All cats have a membrane that acts as a mirror at the back of their eyes.



### Check your understanding

► Mention the name of two animals that can hunt at night based on their super sense of sight.

► Give a reason for :

The fishing cat's eyes seem to glow in the dark.

► Put (✓) or (✗):

1. The type of adaptation in the fishing cat's eyes is a behavioral adaptation. ( )
2. The membrane in a fishing cat's eyes is found in all animals that are active during the nighttime. ( )

• Let your child answer the questions to check his/her understanding

### Activity 3

## What Do You Already Know About Light and Sight?

### Sources of light

- There are many sources of light.

#### Source of light :

It is something that gives off (emits) its own light.

#### Examples of sources of light



The Sun



Electric lamps



Candles



Flashlight



Fire

- There are other objects that **don't emit** their own light, but they **reflect** the light falling on them, so they are not considered as sources of light such as :



The Moon



Mirror

#### Notes for parents

- Discuss with your child the meaning of source of light and the examples of sources of light

## How we see

- Some people think that there are light rays emitted from the eyes and fall on the objects around us so we can see these objects, but this is **not true**.
- In fact we can see objects due to the presence of a source of light that emits light rays that fall on objects and bounce off these objects to the eye to see them, as shown in the figure.



### Check your understanding

#### ► Complete :

There are many sources of light such as ..... , ..... and .....

#### ► Put (✓) or (✗) :

1. The light falling on an object bounces back to reach the eye  
so that we can see. ( )
2. The Moon is considered a source of light so it appears luminous at night. ( )

In the Exercises Book :

Try to answer :

- Exercises on Lesson ① p. 69
- Self-Assessment ⑫

- Discuss with your child how we see in the presence of a source of light

**Hunting in the Dark**

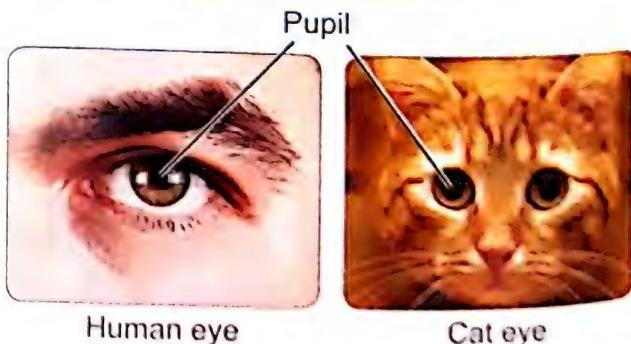
► Put  in front of the living organisms that can easily see in the dark during the nighttime :



You have learnt from the previous lessons that it is difficult for a person to see clearly in the dark, but many nocturnal animals have spectacular night vision, because they hunt their preys at night and avoid predators so, they adapt to see in the dark.

**The differences between human eyes and nocturnal animal eyes**

- Nocturnal animals have bigger eyes which are more sensitive to light than humans.
- The pupils of their eyes usually open wider than the pupils of humans' eyes, to allow more light enters their eyes.

**Note**

Nocturnal animals can detect the environment around them in the weakest light levels, but in complete darkness they depend on other senses such as hearing, touching and smell, that help them hunt and move in the dark.

**Notes for parents**

- Discuss with your child the differences between human eyes and nocturnal animal eyes.

► Now, we will study another example of these nocturnal animals :

### The tarsier

- **Its environment :**

Southeast Asia.

- **Its type :**

Tiny "primate" monkey from mammals.

- **Its length :**

About 10 centimeters long, not including its tail.



Tarsier

- **Its food :**

Insects, small lizards or birds.

- **Its structural adaptation :**

The tarsier like owl in some structural adaptations such as :

**1. Eyes :**

- Tarsier has huge eyes like owl, to gather and reflect any light available to give it a picture of its surrounding.
- Tarsier can't move its eyes in their sockets like owl.

**2. Head :**

- Tarsier can turn its head 180 degrees like owl, to focus on distant or near objects at night.



### Check your understanding

► Put (✓) or (✗):

1. Human needs a source of light to see clearly in the dark. ( )
2. Human eyes have a structural adaptation similar to those of cats and tarsiers. ( )
3. Cats have wide pupils to help them see in low light. ( )
4. Tarsier can rotate its head in wide directions. ( )

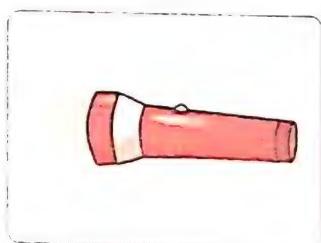
• Discuss with your child the structural adaptation of the tarsier.

## Activity 5

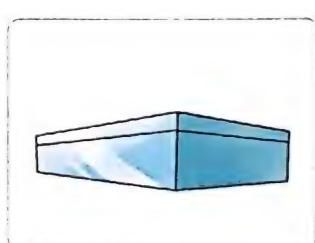
# Light Observations

- You have learnt in the previous lesson that our eyes need light to see objects clearly.
- **Now,** we are going to do an experiment to show that human needs light to be able to see things in dark places clearly.

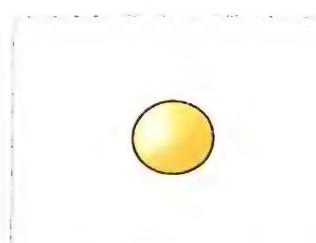
### ► Tools



Flashlight



Small box



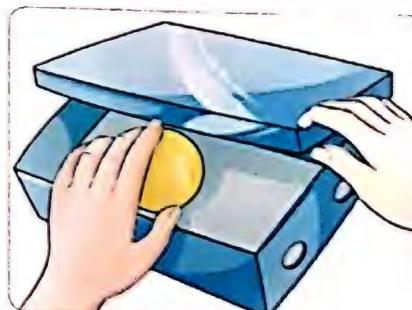
Small ball

### ► Steps

1. Make two holes on one side of the box next to each other so that the distance between them is approximately 5 cm.



2. Place the ball inside the box and close it.



3. Cover one of the holes with your hand and look through the other hole to see the ball.



### Notes for parents

- Let your child do the experiment to know the importance of light.

## ► Observation

You won't be able to see the ball.

4. Take your hand away and replace it with a turned on flashlight, and look again through the other hole to see the ball.



## ► Observation

You will see the ball clearly.

## ► Explanation

- We wouldn't be able to see the ball when the box was completely dark, because there is no light source and also the ball don't emit light.
- But, when there is a light source, we can see clearly, because the light from the flashlight falls on the ball and then returns to the eye, so we can see.

## ► Conclusion

Presence of light is necessary for us to be able to see things clearly.



## Check your understanding

### ► Put (✓) or (✗):

1. We can see objects that emit light or reflect light on our eyes. ( )
2. There must be light to be able to see things clearly in dark places. ( )

In the Exercises Book :

Try to answer :

- Exercises on Lesson ② p. 74
- Self-Assessment ⑬

- Help your child to conclude that the presence of light is necessary for humans to be able to see things clearly.

# Lesson 3

## Activity 6

### Light Is Energy

► Look at the opposite figure, then put (✓) or (✗) in front of the following sentences :

1. The boy can see the different objects in the room because his eyes sense the light and his brain tells him what he is seeing. ( )
2. If the light is turned off, the boy will see the different objects in the room. ( )
  - You have learnt about how the nervous system works with sense organs.
  - Seeing with our eyes is a way to collect information about the world around us.
  - Now, let's learn how light helps the eyes see.



#### What is light ?

##### Light :

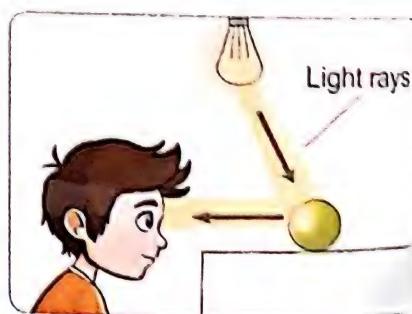
It is a visible form of energy that travels in the form of light waves.

► In order to see an object :

Light must bounce off an object into the eyes.



Then the eyes send messages to the brain, where the information is processed so, the brain interprets the messages as an image of a ball.



#### Notes

- It is much easier to see objects in bright light compared to objects in dim light.
- In the absence of a light source, the human eye cannot see anything.



#### Check your understanding

► Put (✓) or (✗) :

1. The human eyes can see in a completely dark room. ( )
2. The nervous system has an important role in vision. ( )

#### Notes for parents

- Discuss with your child the meaning of light and how light helps the eyes see.

## Activity 7

# Special Eye Structures

- You have known how light impacts humans' ability to see.
- In order for humans to see an object, light must fall on the object and be reflected into the eyes, then the structures in human eyes transmit messages to the brain to tell humans what they are seeing.
- Now, we will learn about a structural feature in the eye of some animals that allows them use very small amounts of light in a highly effective way.

### Special eye structures

Deers, horses, cats and dogs have a feature that relates to the sense of sight, called the "tapetum lucidum".



### Tapetum lucidum

Tapetum lucidum is a thin reflective layer, at the back of some animals' eyes that reflects light as you have studied this layer in fishing cat's eye.

### Note

Tapetum lucidum is a Latin term which means "tapestry of light".

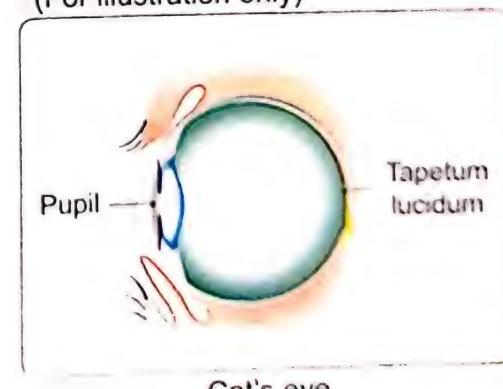
#### ► Tapetum lucidum is a structural adaptation that help some animals to :

- See and hunt at night.
- Avoid being hunted at night.

### How tapetum lucidum works :

- When the light enters the eyes of such animals and falls on the tapetum lucidum layer, it bounces off it like a mirror.
- The light that the eyes do not detect at first passes through to the tapetum lucidum and get bounced back for second time that makes the eyes of such animals get more amount of light at nighttime.

(For illustration only)



- Discuss with your child the structural adaptation that some animals have in their eyes.

### Note

The reflection of light from tapetum lucidum causes the glow of the cat's eyes when light shines on them in the dark.



### Check your understanding

► Put (✓) or (✗), then correct the wrong ones :

1. Horses' eyes are structured to use light reflection in order to see well in low light conditions. ( )
2. Tapetum lucidum is a structural adaptation in the human eyes. ( )
3. Cats can see in the dark due to the presence of a thin reflective layer in their eyes. ( )

► Give a reason for :

The presence of tapetum lucidum in the eyes of some animals.

► Choose the correct answer :

Dogs have a structural feature that is related to the sense of called tapetum lucidum.

- a. hearing
- b. smell
- c. sight
- d. taste

In the Exercises Book :

Try to answer :

- Exercises on Lesson ③ p. 78
- Self-Assessment ⑭

### Notes for parents

- Let your child answer the questions to check his/her understanding

## Lesson

# 4

## Activity 8

### Reflection

► Look at the opposite figures, then answer :

1. Do you think light will reflect in figure (A) ?

**Yes**

**No**

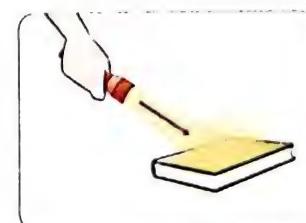


Figure (A)

2. Do you think light will reflect in figure (B) ?

**Yes**

**No**

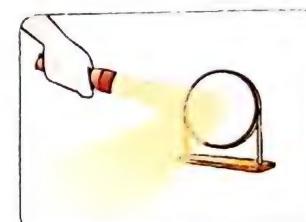
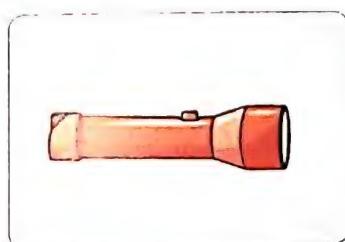
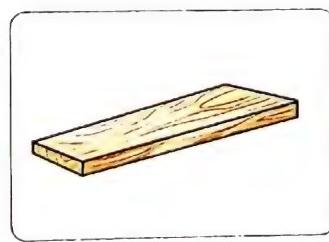


Figure (B)

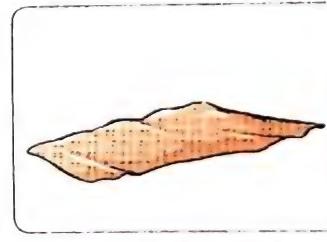
### ► Materials



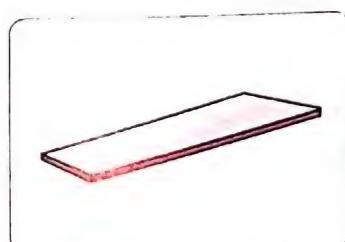
Flashlight



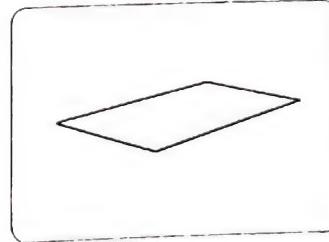
Piece of wood



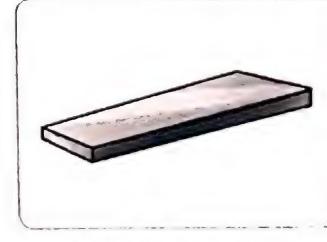
Piece of cloth



Piece of plastic



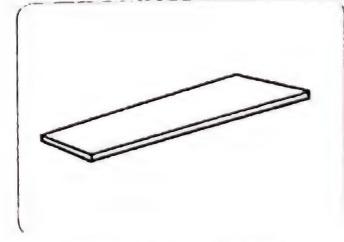
Paper



Piece of metal



Mirror

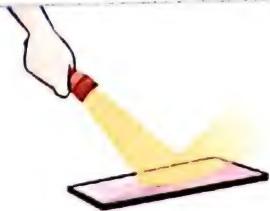
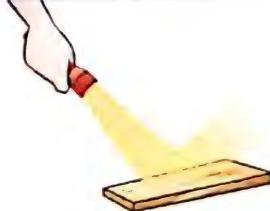
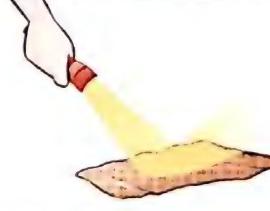
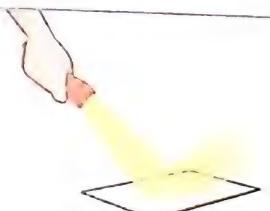
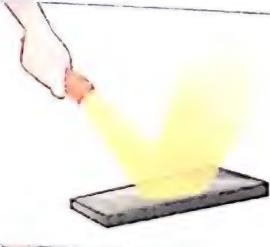


Piece of glass

### ► Step

Shine the flashlight on each of the previous different materials.

- Let your child do the experiment to know how light interacts with different types of materials

Materials	Figures	Observations
The piece of plastic.		Plastic reflects small amount of light rays.
The piece of wood.		Wood reflects small amount of light rays.
The piece of cloth.		Cloth reflects small amount of light rays.
The mirror.		Mirror reflects large amount of light rays.
The paper.		Paper reflects small amount of light rays.
The piece of metal.		Metal reflects large amount of light rays.
The piece of glass.		Glass reflects very small amount of light rays.

#### Notes for parents

- Let your child observe how the light interacts with different materials.

## ► Conclusions

- Shiny and smooth materials (such as : mirror and metal) reflect light better than the other materials.
- Rough materials (such as : plastic, wood, cloth and paper) reflect light less than smooth materials.
- Transparent materials (such as : glass) reflect very small amount of light.



## Check your understanding

### ► Put (✓) or (✗):

1. Shiny objects tend to reflect light better than rough objects. ( )
2. Wood reflects light more than a mirror. ( )
3. Glass reflects light less than metals. ( )

### ► Choose the correct answer :

1. Which of the following objects is shiny and smooth ? .....  
**a.** Metallic spoon.                           **b.** Plastic spoon.  
**c.** Wooden chair.                              **d.** T-shirt.
2. All the following materials are rough except .....  
**a.** cloth.           **b.** mirror.           **c.** wood.           **d.** paper.

• Let your child answer the questions to check his/her understanding.

## Activity 9

# Light Strikes Matter

- You have learned about how different materials reflect light.
- Now, we will learn how light behaves when it interacts with different types of matter.



### Light strikes matter

Light reflection

- Light is a form of energy that always travels in straight lines in the form of waves.

#### ► When traveling light hits an object :

- Some of the light energy is absorbed.
  - Some of the light energy may go through the object.
  - Some of the light energy reflects off (bounces off) the object's surface.
- Objects that light cannot pass through are called "opaque".

#### Opaque objects :

They are objects that don't allow light to pass through.



Opaque object

Examples of opaque substances : plastic, wood and metal.

### Why do you see your shadow ?

Opaque objects (including the human body) always form shadows in the presence of light.

Shadow happens because all the light that hits the body either bounces off or is absorbed. So, none of the light passes through the body.



- Objects that light can pass through are called "transparent".

#### Transparent objects :

They are objects that allow light to pass through.



Transparent object

Things can be seen through transparent objects.

Examples of transparent substances : air, water, windows and lenses.

### Notes for parents

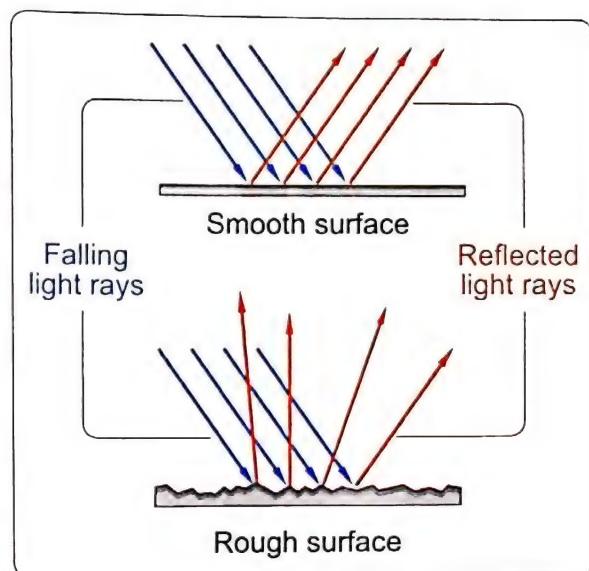
- Discuss with your child the meaning of opaque and transparent objects and some examples of both of them.

## The reflected light depends upon the smoothness of the surface :

- If the surface is a polished mirror, the rays will reflect at the same angle at which they strike (hit) the object originally.
- If the surface is a painted surface (slightly rougher), the rays will reflect in different directions.

### Note

Rough surfaces scatter or diffuse light.



## ► How does light striking matter make it possible for humans and animals to see ?

When light waves strike an object, light reflects off (bounces off) this object.

The reflected light travels in a straight line into the eyes.

Special nerves in the eyes send messages to the brain.

The brain interprets the messages as an image of this object.



### Check your understanding

#### ► Write the scientific term :

1. Objects that allow light to pass through.

(.....)

2. Objects that don't allow light to pass through.

(.....)

In the Exercises Book :

Try to answer :

- Exercises on Lesson 4 p. 81
- Self-Assessment 15

- Discuss with your child that the reflected light depends upon the smoothness of the reflecting surface.

**Sight Model**

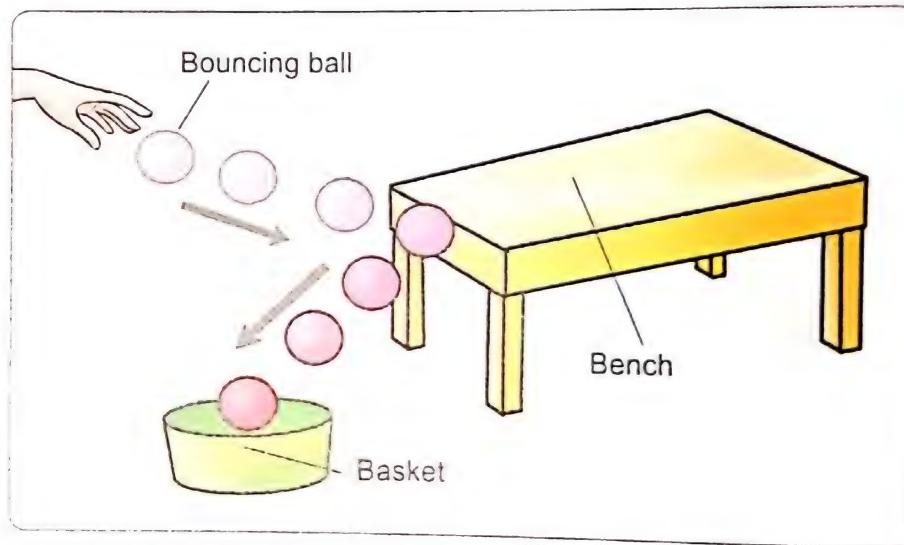
- Look at the opposite figure, then put (✓) or (✗) in front of the following sentences :

1. Light comes out of the eye and falls on the book so, we can see the book. ( )
2. Light travels from the source of light and hits the book, then reflects off the book into the eye. ( )



- Now, let's make a model to show how the reflection of light affects the sense of sight.

- Imagine using a bouncing ball to model how the eye see the reflected light.



- In this model, if the ball bounces off the bench and go into the basket. According to this model, try to choose the correct answer in the following questions :

- The bouncing ball represents ..... (light rays – the eye – an object)
- The bench represents ..... (light rays – the eye – an object)
- The basket represents ..... (light rays – the eye – an object)

- From the previous model, we conclude that :

Light reflects off an object into the eye, so we see the object.

**Notes for parents**

- Let your child make a model to show how the eye see the reflected light

## Activity 11

# Record Evidence Like A Scientist

In this concept, you have learnt a lot about how vision works.

- Now, try to think like a scientist by writing your evidence and your scientific explanation for the question and hypothesis about one of the main points of this concept through the four steps you have learnt in the first concept.

### Step 1 The Question

What needs to happen for humans or other animals to see an object in low-light areas?

### Step 2 My Hypothesis (claim)

In low-light areas, light should hit an object that reflects the light to my eyes to see this object.

### Step 3 My Evidence

### Step 4 My Scientific Explanation

- Help your child to think like a scientist by writing his/her evidence and scientific explanation about the question in step ①.

# Lesson 6

## Activity 12

### STEM in Action

► Look at the opposite picture, then answer :

1. Does the girl in the picture have a problem in her eyesight ?

Yes

No

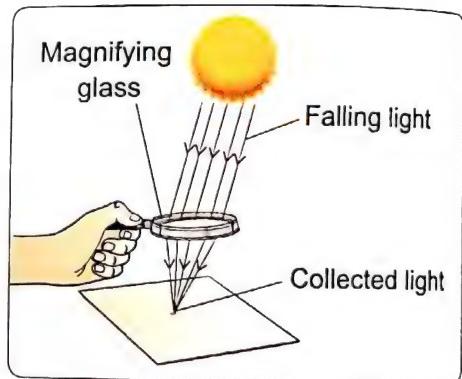
2. Do the glasses that she is wearing work to help her see better ?

Yes

No

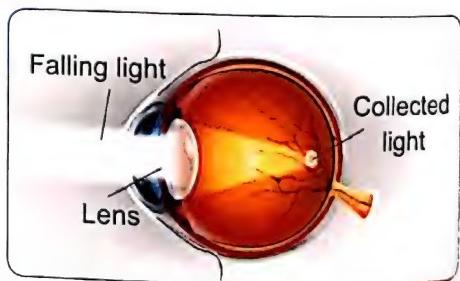


- The eye has a lens acts as a magnifying glass.
- The magnifying glass can take the sun rays and concentrate them on a single point, as shown in the figure. As well as, the eye works in the same way.



#### What happens when the light reaches the eye ?

- The lens inside the eye **focuses** the light that falls on it onto the back of the eye.
- When the lens focuses light, it **collects** the light in a point, so you can see different objects.



Human eye

#### How do optometrists help us see ?

- If the lens in the eye does not focus the light properly, the person may have **blurry vision**.
- Some people are not able to see far objects, while some other people are not able to see near objects. Also, there are some other people have difficulties distinguishing between colors.

#### Note

**Optometrist** : A doctor who specializes in vision and eyesight.

#### Notes for parents

- Discuss with your child how the eye lens works when the light reaches the eye.

- Optometrists can test the eyes to determine whether the lens is focusing the light properly.
- An optometrist can determine how to correct the vision by different ways such as :
  - Using glasses or contact lenses.
  - Using laser surgery.



### **Note**

Optometry students learn how to prevent blindness, treat eye diseases and correct vision.



### **Check your understanding**

#### ► Put (✓) or (✗) :

1. The lens inside the eye focuses the light onto the back of the eye. ( )
2. Optometrist can correct the problems of eyesight by using laser surgery. ( )
3. If a person is not able to see far objects this means that his eye lens is focusing the light properly. ( )

#### **In the Exercises Book :**

##### **Try to answer :**

- Exercises on Lesson 6 p. 86
- Self-Assessment 16
- Model Exam on Concept (1.3)

- Discuss with your child some problems of the eyesight and how optometrists can correct these problems.

## Activity 13

# Review : Light and Sight

► We can summarize this concept in the following main points :

- **The fishing cat** is a wild cat that hunts during the nighttime and its eyes seem to glow in the dark.
- All cats have a membrane that acts as a mirror at the back of their eyes.

### Source of light :

It is something that gives off (emits) its own light.

**Examples** : the Sun, electric lamps, candles, flashlight and fire.

- There are other objects that don't emit their own light, but they **reflect** light falling on them, so they are not considered as sources of light such as : the Moon and mirror.
  - We can see objects due to the presence of a source of light that emits light rays that fall on objects and **bounce off** these objects into the eyes, then the eyes send messages to the brain, where it interprets the messages as an image.
  - Nocturnal animals have **bigger eyes** which are more sensitive to light than humans.
- 
- **The Tarsier** is a tiny "primate" monkey from mammals.
    - Tarsier has huge eyes to gather and reflect any light available.
    - Tarsier can turn its head 180 degrees to focus on distant or near objects at night

### Light :

It is a visible form of energy that travels in the form of **light waves**.

- Light travels in straight lines.
- In the absence of a light source, the human eye cannot see anything.
- **Tapetum lucidum** is a thin reflective layer, at the back of some animals' eyes such as deers, horses, cats and dogs.
- Tapetum lucidum is a **structural adaptation** that helps some animals to see, **hunt** and avoid being hunted at night.
- Shiny and smooth materials (such as : mirror and metal) reflect light better than the other materials.

### Notes for parents

- Help your child review the main points in this concept.

- Rough materials (such as : plastic, wood, cloth and paper) reflect light less than smooth materials.
- Transparent materials (such as : glass) reflect very small amount of light.

### **Opaque objects :**

They are objects that don't allow light to pass through.

**Examples** : plastic, wood and metal.

- Opaque objects (including the human body) always form shadows in the presence of light.

### **Transparent objects :**

They are objects that allow light to pass through.

**Examples** : air, water, windows and lenses.

### **• The reflected light depends upon the smoothness of the surface :**

- If the surface is a polished mirror, the rays will reflect at the same angle at which they strike the object originally.
- If the surface is a painted surface, the rays will reflect in different directions.
- The lens inside the eye focuses the light that falls on it onto the back of the eye and collects the light in a point, so you can see different objects.
- Optometrist can test the eyes to determine whether the lens is focusing the light properly.
- Optometrist can determine how to correct the vision by different ways such as :
  - Using glasses or contact lenses.
  - Using laser surgery.

# Concept 1.4

## Communication and Information Transfer





## Learning outcomes

By the end of this concept, your child will be able to :

- Compare solutions that use patterns to transfer information.
- Develop a model of a communication system with many parts that work together to transfer information from one place to another.
- Argue, using evidence, that light and sound allow for the transfer of information through systems of communication.
- Compare innovative human designs to systems of communication in the natural world.
- Design, test, and evaluate models of information-transfer systems that can send and receive coded information.



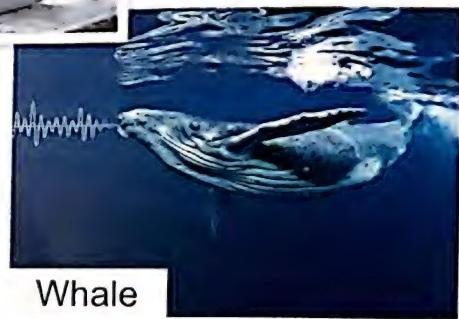
## Key vocabulary

- Code
- Echolocation
- Pitch
- Satellite
- System

# Lesson 1

## Activity 1

# Can you Explain?



### ► How can humans and animals receive and send information ?

- You have learned from the previous concepts how humans and animals adapt by using their senses to gather information about the environment around them.

### ► Now, we will learn how do humans and animals use light and sound to send and receive information ?

- Human can communicate by receiving and sending information through speaking, writing, reading ... etc.
- Fireflies beetles produce flash lights using their wings to warn off predators or to attract a mate.
- Whales communicate with each other by using the songs they produce as tones to make music.

► From the previous explanation, we can conclude that animals and humans send and receive information with different communication systems.

### ► In this concept, we will study :

- Firefly light show.
- Song of whales.
- Animals communicate with movement.
- Alphabet and written language.
- Transferring information.
- Communication systems.

### Notes for parents

- Discuss with your child the different ways that humans and animals can use in communication.

## Activity 2

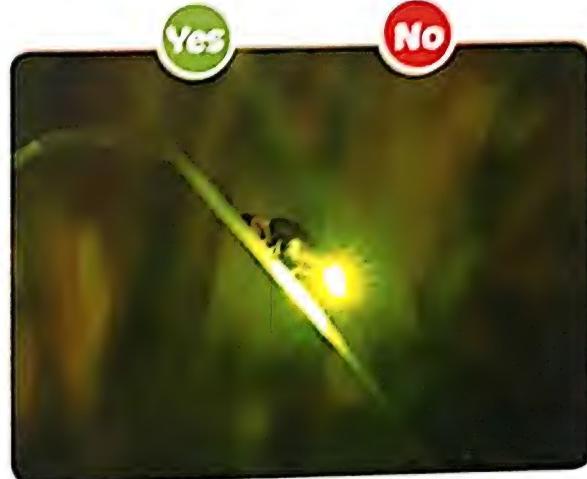
# Firefly Light Show

• Look at these pictures, then answer the questions :

- Can dolphins communicate with each other through sound ?



- Can fireflies communicate with each other through light ?



► What do you notice when you look at the opposite picture ?

- You will notice that, it looks like a light show in a forest.
- These lights are not produced by humans. They are produced by thousands of small insects known as "fireflies beetles".



► How do fireflies beetles produce the lights they use to communicate ?

- Fireflies produce a **chemical reaction** inside their bodies that allows them to light up and communicate with other fireflies.

► How are fireflies used their senses to communicate ?

1. Fireflies are winged beetles and they use their wings to flash to warn off predators or to attract a mate to reproduce.
2. They naturally flash at regular intervals, but if there is another group of fireflies flashing nearby, they will change their own flash pattern and start over again to match the flash pattern of the other group to communicate.

• Discuss with your child the way through which fireflies communicate

## ► The interaction between humans and nature :

- Humans can influence the fireflies patterns, where a group of artists wanted to discover this influence by using flashing LED lights to imitate the nature of the fireflies patterns as follow :
  - The artists set up lights in the forest to go on and off at regular intervals or in a pattern.
  - A large group of fireflies responded by flashing back at the same time.

## ► The previous explanation shows the interaction between humans and nature and how they can imitate each other.

### Note

Humans use lights to communicate with each other to transfer information visually or by using electronic devices.



Check your understanding

### \* Complete:

- 1 Fireflies produce a ..... inside their bodies that allows them to ..... and .....
- 2 Fireflies use the ..... to flash to warn off predators.

### ► Give a reason for:

A group of fireflies change their flash pattern when another group of flashing fireflies comes nearby.

### Notes for parents

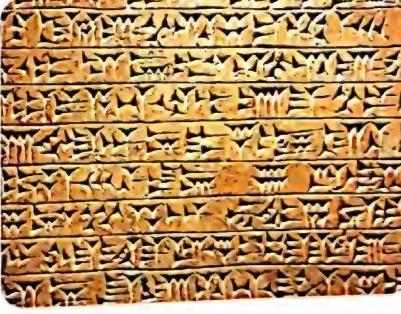
- Let your child answer the question to check his/her understanding.

### Activity 3

## Alphabet and Written Language

- There are many ways to communicate and send messages where, people use language to communicate by reading, writing and speaking.
- Whatever how the message is sent, it must be in a language understood by the sender and the receiver.
- The ability to communicate through language and speech separates humans from animals.

Now, we will study how do humans use language to send and receive information :

Egypt	Iraq	Central America
<ul style="list-style-type: none"><li>Around 3000 BCE, ancient Egyptians created <b>hieroglyphics</b> language which is a writing system made up of about 700 symbols.</li></ul> 	<ul style="list-style-type: none"><li>Also, around 3000 BCE, the Babylonians in Iraq created a writing system called cuneiform drawings.</li></ul> 	<ul style="list-style-type: none"><li>In central America, the ancient Mayans created another <b>hieroglyphs</b> that included almost 800 different signs.</li></ul> 

- Letters, like those in an alphabet were developed later.
- At the beginning of the 15<sup>th</sup> century BCE, various cultures improved and developed a system for writing words using combination of letters.

### Paper in old ages :

- Ancient Egyptians created **papyrus** which is a kind of paper made up of from a reed that grows in the marshes near the River Nile.



Papyrus paper

- Help your child to use some online sources to know more about the old languages mentioned in this activity.

- In 105 CE, the Chinese created a form of paper using the inner bark of mulberry plant and bamboo fibers found in its pulp.



Chinese paper

### **Note**

Written language allows humans to communicate with each other in our present time, understand the past, and share ideas with future civilizations.



### Check your understanding

#### Put (✓) or (✗):

- Ancient Egyptians created cuneiform drawings. ( )
- Humans use language to communicate with each other. ( )

#### Choose:

- Different types of paper are used in all the following purposes except .....
  - drawing.
  - communication.
  - transfer written information.
  - transfer light waves.
- Ancient Egyptians use ..... plant in making paper.
  - bamboo
  - mulberry
  - papyrus
  - cactus

#### Notes for parents

- Let your child answer the questions to check his/her understanding.

## Activity 4

# What Do You Already Know About Communication and Information Transfer ?

► In this activity, we will know :

- How humans and animals communicate and transfer of information.
- The similarities and differences between types of communication in humans and animals.



• Classify each type of communication in the following table by writing :

Animal (A) or Human (H) or Both (B) :

Type of communication	Animal (A) or Human (H) or Both (B)
Echolocation :	
Reading :	
High-pitched sound :	
Writing :	
Watching TV :	
Displaying light :	
A cell phone :	
Movements :	
An electronic reader device (e-reader) :	

In the Exercises Book :

Try to answer :

- Exercises on Lesson ① p. 90
- Self-Assessment ⑯

- Help your child to complete the table above to learn the different types of communication used by humans, animals or both.

# Lesson 2

## Activity 5 Song of Whales

► Complete the following statements by using these words :

(Light – Language – Sound)



Whales communicate with each other through .....



Fireflies communicate with each other through .....



Humans communicate with each other through .....

- Although animals do not talk like humans, they still communicate with each other using special systems of communication.
- Animals can use different senses to send and receive information.
- Now, we will study whales as an example of animals that can use songs to communicate with each other under water.

### Humpback Whales

- Humpback whales sing under water to communicate with each other, where they sing a wide range of notes (tones) and a series of songs.
- Humpback whales songs have different sounds depending on the season, where :
  - They sing during the winter months which is the mating season.
  - They sing other songs during the summer months.
  - They sing other different songs during the feeding season.



### Notes for parents

- Discuss with your child the way of communication that humpback whale use.



**Sound is described as :**

- High-pitched sound which is soft such as "the voice of woman".



- Low-pitched sound which is rough such as "the voice of man".



- Similarly, the voice of humpback whales is high-pitched or low-pitched according to the seasons, where :

In winter	In summer
The songs of humpback whales have high-pitched sounds.	The songs of humpback whales have low-pitched sounds.
High-pitched sounds travel better through cold water.	Low-pitched sounds travel better through warm water.



- Humpback whales know when to change the pitch of their voices.



## **Check your understanding**

► Choose the correct answer :



- Let your child answer the questions to check his/her understanding

## Activity 6

# Transferring Information

### ► You have known from the previous concepts that :

- Sense organs collect information about the world around us then send it to the brain through nerves for processing and understanding.
- The senses can also be used to communicate, or share information with others.

### Examples :

1. Ears detect sound energy to gather information from the environment and communicate with others.
- 2 . Eyes use light energy to gather information from the environment and communicate with others.

### ► The different kinds of information that the eyes receive :

- Our eyes can detect light that travels very fast through the air, this means that our eyes can detect signals that travel very fast over different distances such as :

1 When someone waving at you from a distance, you see him and understand what he means.



2 When your eye see a red traffic light, it sends a signal to stop.



3 People use a rescue flare to communicate with each other.



4 People use signal fires to communicate over distances of many kilometers.



### Notes for parents

- Discuss with your child the different ways that humans use to transfer information.

5 Many hikers (travelers) use mirrors for flashing to attract the attention of rescue helicopters and communicate with them.



6 Lighthouses encode information in flashes of light that tell sailors where they are.



### Codes and transferring information

#### Code :

It is information that transformed into another representative form (such as using dots and dashes to represent letters).

- Humans use codes to transmit information.
- Codes can be as simple as a thumbs-up or thumbs-down or a red or a green traffic light.
- Expressions on faces are codes that can help people predict our feelings such as :



① Thinking



② Feel happy



③ Feel sad



④ Feel angry



- Discuss with your child the meaning of code and let him/her mention other examples of codes that humans can use.

### Other forms of codes :

1. **Language** : It is a code in a form of sound, where different languages are different codes, but they all enable the transfer of information.
2. **Writing** : It is a code that uses symbols in a pattern to give a specific meaning according to the arrangement of letters in a word.
3. **Music or Sounds** : Different sound tones produced from humans, musical instruments, ... etc. can be used in communication.

► When sense organs receive this information and send messages to the brain, the brain decodes and interprets the meaning.



### Check your understanding

#### ► Complete :

1. Sense organs collect information about the world around us and send it to the ..... through ..... for processing and understanding.
2. From forms of codes are ..... and .....
3. The ..... is the information that transformed into another representative form.

#### In the Exercises Book :

##### Try to answer :

- Exercises on Lesson ② p. 94
- Self-Assessment ⑯

#### Notes for parents

- Let your child answer the questions to check his/her understanding.

# Lesson 3

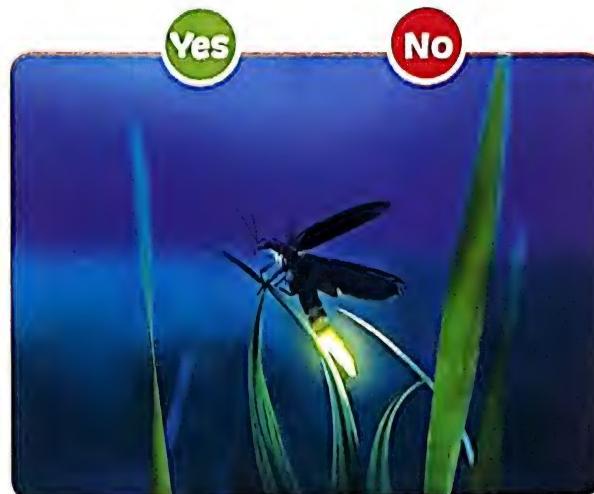
## Activity 7

### Inventing a code

- Humans can communicate through sounds ?



- Fireflies can communicate through light ?



- You have known from the previous lessons that fireflies use flashing light patterns to send messages.
- Humans have designed similar code systems using light or sound, one of these systems is **Morse Code**.

#### Morse Code

1. It is a communication system developed by **Samuel Morse** in the 19<sup>th</sup> century.
2. It is a simple code consists of **short beeps** known as **dots** and **long beeps** known as **dashes**.  
Different dashes and dots represent different letters of alphabet.
3. This code allows people to spell words using sounds of long and short beeps.



Morse code device

#### MORSE CODE

A	B	C	D	E	F	G
H	I	J	K	L	M	N
O	P	Q	R	S	T	
U	V	W	X	Y	Z	

#### Note

Sometimes, in Morse code people can use long and short flashes of light instead of long and short beeps.

- Now, we will invent a code that is similar to Morse code in this experiment to send and receive messages without talking.

- Discuss with your child the meaning of Morse code.
- Let your child use some online sources to know more about Morse code.

## ► Tools



A flashlight.



Pencils.



Notebooks.



A small drum.

## ► Steps

1. Share one of your friends to create a unique code (signal) for every letter of the alphabet.
2. Each one of you should write down this code in his notebook.
3. On a separate sheet of paper, write a unique message that is no more than five words (without being seen by your friend).
4. Stand on one side of the room (where you are the sender) holding the drum and your friend on the other side of the room (where he is the receiver).
5. Use the drum to send your encoded message to your friend (the receiver).
6. Let your friend decode your message according to the code you have created.
7. Repeat the previous steps by using the flashlight instead of the drum.
8. Talk with your friend to compare the two messages that he was received even by using the drum or the flashlight to the original message you have wrote in step ③.



## ► Observations

- You and your friend may have incorrectly sent signals or incorrectly interpreted them.
- Your code may have included the same encoding for more than one letter.

## Notes for parents

- Try to do the previous experiment with your child.
- Discuss with your child the incorrect sent or received signals if found.

## Conclusion

- We can send encoding message to communicate with each other through different ways such as :
  1. Using light energy that depends on the sense of sight.
  2. Using sound energy that depends on the sense of hearing.

## Note

To improve your code you can :

- Simplify your code.
- Make the letters more distinct.



## Check your understanding

► Put (✓) or (✗) :

1. In Morse code, we use sound to send encoding message to communicate with each other. ( )
2. Morse code consists of long beeps known as dots and short beeps known as dashes. ( )

In the Exercises Book :

Try to answer :

- Exercises on Lesson ③ p. 98
- Self-Assessment ⑯

• Let your child answer the questions to check his/her understanding

► Look at these pictures, then put (✓) or (✗):



1. Humans can communicate with each other through sound or light. ( )

2. Bats can communicate with each other through light. ( )

- You have known from the previous lessons that humans and animals use variety of ways to communicate as sound, light and movement.
- Now, we will study the **Honeybees** as an example of animals that use movement to communicate with each other.

#### Bees and how they communicate with each other

- Bees use **movement** to communicate with each other.
- In the hive, bees can communicate to find **food and water resources** by doing a **special dance**, and the movements of this dance represent a **code** to communicate with each other, where :
  - The dancing bee moves in a figure-eight pattern, while vibrating its wings.
  - These movements of the dance **tell the other bees the correct direction and distance to the food resources**.
  - The bees in the hive read the code of the dancing bee and then fly off to the specific location.



#### Notes for parents

- Discuss with your child the way through which honeybees communicate with each other using some special movements.

► From the previous explanation, we can conclude that :

- Honeybees use movement to send messages to communicate with each other.
- Also, humans use movements to communicate such as :
  - **Sign language** that is used by people of special needs.
  - **Simple gestures**.



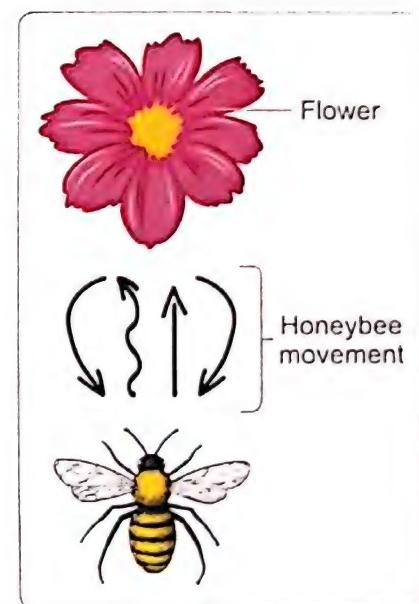
Sign language

### Coding with honeybees

► What is the code used by bees to find food ?

- The scout honeybee faces the direction of the flower.
- The bee does one round dance if the flower is very close.
- The bee does a waggle dance to the right and then to the left if the flower is a little farther away and this is considered as one dance.

► From the previous explanation, we can conclude that the scout honeybees use codes with movements to communicate with other bees that receive these codes through the sense of sight.



Honeybee dance key



### Check your understanding

► Complete :

1. Animals can communicate with each other through ..... , ..... , ..... and .....
2. People of special needs use ..... to communicate with each other.
3. In the hive, bees can communicate to find ..... and ..... resources by doing a special dance.

• Let your child answer the questions to check his/her understanding.

## Activity 9

# Communication Systems

- ▶ You have learnt about several different ways that humans and animals use to communicate specific messages to each other.

- Now, we will study some of communication systems that humans have designed and used to facilitate communication.
- Human communication systems are made of several parts that work together to send and receive information.

### System :

It is a group of related objects that work together to perform a function.

### Examples of communication systems :

- When we use some electronic devices such as a cell phone, a computer connected to the internet or watching TV connected to cable TV, this means that we are using communication systems that depend on **signals** in their work.
- The previous electronic devices are parts of communication systems, but there are many other parts that work to transfer information from one place to another such as :

① Satellites



② Communication towers



③ Software



- When all these parts (elements) come together and each part works correctly, the communication system can perform its work in a way that individual parts cannot.

### Notes for parents

- Discuss with your child the different parts of the technological communication systems.

## Example :

A cell phone by itself cannot help you to talk to your friends, because it is one part of a communication system that consists of many parts (satellites, communication towers and software) that are integrated with each other to complete the function of communication between people.



## Check your understanding

► Put (✓) or (✗) :

1. The electronic devices work to transfer information without being connected to satellites, communication towers and software. (      )
2. Satellites and communication towers are used to transfer information from one place to another. (      )
3. The cell phones communication system depends on signals in its work. (      )

• Let your child answer the questions to check his/her understanding.

## Activity 10

# How Animals use Communication Systems

- You have known from the previous activity that humans use technology systems to communicate with each other.
  - Animals don't use technology systems as we do, but they can still use other systems to communicate with each other.
  - We will study ants as an example of these animals.



## Ants

- Ants live in **colonies** that contain thousands of individuals.
- Groups of ants within a colony have different roles, where they have developed systems that help them divide their work among themselves, so there are **nurse ants**, **scout ants** and **soldier ants**.



## How do groups of ants communicate with each other ?

When the food is low, **nurse ants** send strong smelly messages to **scout ants** which are responsible for locating food.

2 The scout ants respond by sending a smelly message to alert the ants where to find the food.

### Note

The **soldier ants** also use smelly messages to communicate if there is danger nearby.



## Check your understanding

### ► Complete :

1. When the food is low, ..... ants send strong ..... to ..... ants which are responsible for locating food.
2. The ..... ants use smelly messages if there is danger nearby.

### Notes for parents

- Let your child search for some online sources to learn more about ants and how they communicate with each other.

### In the Exercises Book :

#### Try to answer :

- Exercises on Lesson ④ p. 100
- Self-Assessment ⑳

## Record Evidence Like A Scientist

- In this concept, you have learnt a lot about humans and animals communication and transfer information using sound, light and movement.
- Now, try to think like a scientist by writing your hypothesis (claim), your evidence and your scientific explanation about one of the main points of this concept through the four steps you have learnt in the previous concepts.

### Step 1 The Question

How do humans and animals use light, sound and other methods like movement to send and receive information ?

### Step 2 My Hypothesis (Claim)

### Step 3 My Evidence

### Step 4 My Scientific Explanation

\* Help your child to think like a scientist by answering a question about one of the main points of this concept. Then write his/her hypothesis, evidence and scientific explanation.

## Activity 12

# Technology Inspired by Nature

- You have known from concept (1.2) that many animals such as bats use sound to :
  - Communicate with each other.
  - Get information about their surroundings using their hearing sense.



- How bats use their ears to get information about their surroundings in the dark ?

- Bats use their ears for echolocation, where they make a high-pitched sound and then listen for an echo (or reflected sound). When bats hear the reflected sound, they know that there is something nearby.

### Bat Inspired technology

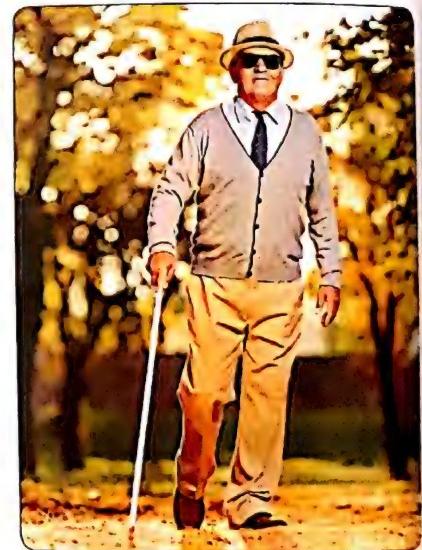
- How scientists were inspired by bat echolocation ?

- Scientists have been inspired (get benefited) by this adaptation to find ways to help blind people detect their surroundings, where :

Scientists have created a special cane that emits a high-pitched sound just like bats do.

#### Note

The pitch of this sound is too high for humans to hear.



As a blind person is walking with this special cane, an echo of this high-pitched sound is picked up by this special cane.

The echo is turned into vibrations that the person can feel with his thumb.

#### Note

The special cane uses vibrations to communicate information about the surroundings to the person using it.

The vibrations of the special cane tell the blind person the direction of the obstacles around him and how close the object is to him.

#### Notes for parents

- Discuss with your child how scientists created a special cane to help blind people to detect their surroundings.

- In this table we can summarize the similarities and differences between the special cane of blind person and bat echolocation.

Special cane of blind person	Bat
<b>Similarities</b>	
<ul style="list-style-type: none"> <li>The special cane of blind person and bats emit a high-pitched sound that bounces off objects with an echo.</li> <li>This special cane and bats receive the echo that can tell how far away objects are.</li> </ul>	
<b>Differences</b>	
<ul style="list-style-type: none"> <li>This special cane picks up an echo from the sound it emits and changes it into a vibration that can tell the blind person where objects are around him.</li> </ul>	<ul style="list-style-type: none"> <li>Bats pick up an echo from the sound they emit but they don't change it into vibrations.</li> </ul>

### How are the special cane of blind person and the honeybee dance similar ?

- Honeybees make a series of movements and vibrations with their wings to communicate flower location to other bees.
- The special cane makes a series of vibrations to communicate to the blind person using it to tell where objects around him are located.



### Check your understanding

#### Put (✓) or (✗) :

1. Bats make low-pitched sound and then listen for an echo. ( )
2. Bats can change the echo into vibrations. ( )
3. The special cane of blind person picks up an echo and changes it into vibrations. ( )
4. The special cane uses vibrations to transfer information about the surroundings to the blind person. ( )

In the Exercises Book :

Try to answer :

- Exercises on Lesson (5) p. 104
- Self-Assessment (21)
- Model Exam on Concept (1.4)
- Model Exam on Theme (1)

\* Let your child know the similarities and differences between the special cane of the blind person and bat echolocation.

# Lesson 6

## Activity 13

### Review : Communication and Information Transfer

► We can summarize this concept in the following main points :

- Humans and animals use variety of ways to communicate with each other as sound, light and movement.
- Humans use movements to communicate as sign language or simple gestures.
- Humans can communicate by receiving and sending information using Language by Speaking , Writing , Reading , .... etc.
- Fireflies beetles produce flash lights using their wings to warn off predators or to attract a mate.
- Ancient Egyptians created hieroglyphics language which is a writing system made up of about 700 symbols.
- Babylonians in Iraq created a writing system called cuneiform drawings.
- Ancient Mayans created another hieroglyphs included almost 800 different signs.
- Humpback whales sing under water to communicate with each other.
- In winter, the songs of humpback whales have high-pitched sounds that travel better through cold water.
- In summer, the songs of humpback whales have low-pitched sounds that travel better through warm water.

#### Code

It is information that transformed into another representative form.

- Humans use codes to transfer information.
- Morse code is a simple code consists of short beeps (dots) and long beeps (dashes).
- Bees use movement to communicate with each other to find food and water resources by doing a special dance that represents a code.
- Human communication systems are made of several parts that work together to send and receive information.

#### System :

It is a group of related objects that work together to perform a function.

- The electronic devices work to transfer information when they connect with satellites, communication towers and software.
- Ants communicate with each other through their sense of smell.
- Scientists created a special cane that emits a high-pitched sound just like bats do, to help blind people detect their surroundings.

#### Notes for parents

- Help your child review the main points in this concept

# UNIT ONE Project

## Bat Chat

In this project, you will make a research about bats to learn how their adaptations help them to navigate, hunt and communicate.

► **Read the following paragraph to learn some facts about bats.**

- Bats live in dark places such as caves, where there is not enough light for them to see.
- Bats fly very fast, so they need to be able to avoid hitting different objects during their flying.
- Bats use sound to move around in the dark and also to hunt. To do this, they make a noise in their throats that is very high pitched, so humans cannot hear it.
- When this noise hits the objects around, it bounces back to the bats ears, that allow bats detect where these objects are, so they can avoid hitting these objects while flying, and this process is known as "echolocation".
- In the same way, bats use echolocation property to hunt their preys even if they are tiny as mosquitoes.
- Bats also use sound to communicate with each other, as they make different sounds that mean different things.
- Scientists have discovered that most of sounds that bats produce are arguments about food or where to get sleep.

► **Use the previous paragraph, other printed or online sources to write your hypothesis, evidence and scientific explanation for the following question :**



Bat



\* Let your child read the paragraph about bats and help him/her to search for more information about them in other



### The Question

Why it is helpful for bats to use different sounds to navigate, hunt and communicate ?



### My Hypothesis (Claim)



### My Evidence



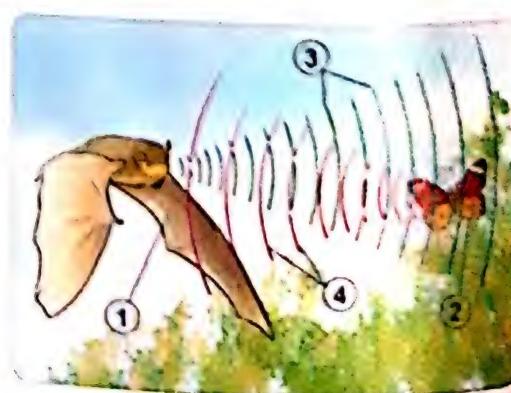
### My Scientific Explanation

► Use the word bank below to label the following figure :

#### Word bank

Prey – Bat – Echo waves bounce back to the bat –  
Sound waves produced from the bat

- ①
- ②
- ③
- ④



- Let your child complete the previous steps and the figure to make a research about bats and share it with his/her friends.

# INTERDISCIPLINARY Project

## The Sinai Blue Agama Lizard

► The Sinai agama is a lizard that can be found in the dry and rocky environments of Eastern Egypt.

In order to survive in this hot environment, this little reptile has some adaptations such as :

- Standing on the top parts of its toes, so that its belly stays high above the hot rocks.
- It has a scaly skin (scales) that traps in water.
- It has a long, thin body that helps it climb and run quickly.



Sinai blue agama lizard

► Agama lizards save energy as they wait in the shaded areas between the rocks for their preys to come by so that they can attack them. They feed on ants, grasshoppers, beetles and other insects.



► The number of Sinai agama lizard decreases as they are negatively affected by human activities such as :

- Catching them to be sold as pets.
- Changing their natural habitat by building roads and sidewalks for people in these areas.

► In this project, use the steps of the **Engineering Design Process** that you have learnt in the previous educational grades to create a sidewalk design that meets the needs of humans without negatively affecting Sinai agama lizards.

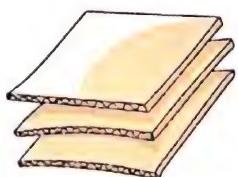
- Let your child find out a solution to an environmental problem through designing a sidewalk for people without affecting the wildlife.

Idea

Create a sidewalk design for people using natural materials such as sand, rocks, wood and clay.

## Materials

**You may use the following materials to build up your design:**



## Carton sheets



Small wooden sticks



## Paper sheets



## Small rocks

## Sand



Wax gun

## Plan

- In this project help your child to use the steps of the Engineering Design Process which are idea, materials, planning, building and improvement.

## **Build**

Draw your sidewalk design.

## **Improve**

Write down your ideas to improve your sidewalk design.

# Glossary



## Concept

## 1.1

Agama lizard	سحلية العجمة	عرض للخطر
Adaptation	تكيف	ثعلب الفينك
Antarctica	القارة القطبية الشمالية	رقبت
Acacia tree	شجرة السنط	أجيال
Anus	فتحة الشرج	خياشيم
Acid	حمض	سام
Air sacs / Alveoli	الهوبيصلات الهوائية	فرضية
Asthma	مرض الربو	شهيق
Amphibians	برمائيات	تأثير
Blood vessels	أوعية دموية	شجرة الكابوك
Blend	يندمج	نقص / ندرة
Burrow	حجر	الأمعاء الغليظة
Bull shark	قرش الثور	الكبد
Belly	بطن	رننة
Behavioral adaptation	تكيف سلوكي	هجرة
Buttress roots	جذور داعمة	شجرة المانجروف
Barbary fig	تين شوكى	المغذيات
Bronchioles	شعيبات هوائية	قطبي
Biologist	عالم أحياء	بلهث
Characteristic	صفة	فريسة
Climate	مناخ	مفترس
Camouflage	التمويه	حرباء النمر
Caracal	القط البري	يتتفاخ
Competition	منافسة	شجرة الصنوبر
Claws	مخالب	سم
Compartment	حجارات صغيرة	البنكرياس
Downy	ناعم	تجريف / حرث
Defense	يدافع	تلوث
Drought	جفاف	بنكائر
Digestive system	الجهاز الهضمي	زواحف
Digestion process	عملية الهضم	غابة مطرية
Diaphragm	الحجاب الحاجز	بقاءً
Esophagus	المري	الجهاز التنفس
Enzymes	أنزيمات	عملية التنفس
Exhalation	زفير	بيت حأ
Extinction	انقراض	نشر
Evidence	دليل	تكيف تركيب
Exhausts	عواودم	أشواك
Ecosystem	نظام بيئي	ترية رطبة
		معدة
		الأمعاء الدقيقة

Saliva	اللعاب	Sensory organ	عضو حسي
Secrets	يفرز	Sensory receptors	مستقبلات حسية
Species	نوع	Signals	اشارات
Tropical	استوائي	Transmit	ينقل
Taproot	جذر رئيسي	Wave	موجة
Trunk	جذع		
Throat (pharynx)	البلعوم		
Trachea	القصبة الهوائية		
Two bronchi	الشعبتان الهوائيتان		
Unique	فريد		
Waxy layer	طبقة شمعية		
Weave	نسج		
Water lily	زنبق الماء / اللوتون		

## Concept 1.3

Blurry vision	رؤية ضبابية
Blindness	عمى / فقد البصر
Concentrate / Focus	يركز
Emit	يصدر
Fishing cat	جبان القط السمّاک
Glow	يتوجه
Interpret	يفسر
Interact	يتفاعل
Lens	عدسة
Laser	الليزر
Membrane	غشاء
Magnifying glass	منظار مكبر
Night vision goggle	جهاز رؤية ليلة
Opaque	معتمة
Optometrists	طبيب العيون
Pupil	بنز العين
Polish	بلع / يصقل
Reflective layer	طبقة عاكسة
Shadow	ظل
Scatter / Diffuse	تفرق / تبعثر
Surgery	جراحة
Tarsier	حيوان النارسir
Tapetum lucidum	الباط الشفاف
Transparent	شفاف
Visible	مرئي

## Concept 1.2

Bowl shape	شكل وعاء	Shallow	अदھن
Backbone	ال العمود الفقري	Spine	स्पाइन
Communication	أتصال	Communication	कॉम्युनिकेशन
Egyptian mongoose	النمس المصري	Mongoose	मोग्नोज़िस
Extraordinary	أستثنائي	Extraordinary	अस्ट्रॉडनरी
Echo	صدى	Echo	एचो
Echolocation	تحديد الموضع بالصدى	Echolocation	एचोलोजिंग
Electrical impulses	نبضات كهربائية	Electrical impulses	इलेक्ट्रिकल इम्पुल्स
Gather	يجمع	Gathering	ग्रहण
Integrally	تكاملى	Integrally	इंट्रिगली
Jerboa	حيوان البربر	Jerboa	जेरबा
Mammals	ثدييات	Mammals	मैमल्स
Mosquito	بعوضة	Mosquito	मोशिक्को
Muscles	عضلات	Muscles	म्यूस्क्युलर्स
Nocturnal animal	حيوان ليلي	Nocturnal animal	नोक्टर्नल एनिमल
Nervous system	الجهاز العصبي	Nervous system	नर्वसिस्टम
Nerves	أعصاب	Nerves	नर्व्स
Processing	معالجة	Processing	प्रोसेसिंग
Reflection / Bounce	أنعكاس / ارتداد	Reflection / Bounce	रिफ्लेक्शन / बांबन्च
Response	استجابة	Response	रिप्लिएशन
Reflex action	رد فعل منعكس	Reflex action	रिफ्लेक्स एक्शन
Reaction time	زمن الاستجابة	Reaction time	रिएक्शन टाइम
Rodents	توارض	Rodents	रोडेंट्स
Stimuli	مثير / حافز	Stimuli	स्टिम्युलस
Spinal cord	المحل الشوكى	Spinal cord	स्पाइनल कोर्ड

## Concept 1.4

Babylonians	البابليون
Bamboo	نبات الحيزران
Blind	كُفَّف
Chemical reaction	تفاعل كيميائي
Cuneiform	مساربة
Culture	ثقافـة

Civilization	حضارة	Thumb
Code	شفرة	Vibrate / Waggle
Colonies	مستعمرات	
Cane	عكاز	
Decode	جعل شفرة	
Electronic devices	أجهزة إلكترونية	
Encode	بنشر	
Firefly beetles	الحناش المنضبطة	
Flash	ومضات	
Flare	شعلة	
Gestures	إيماءات	
Hieroglyphic	هيروغليفى	
Humpback whale	الحوت الأحدب	
High pitched sound	صوت حار	
Hikers / Travelers	رحلة / مسافرين	
Hive	خلية النحل	
Imitate	يقلد	
Improve	يحسن / يطور	
Inner bark	لحاء الشجر الداخلى	
Low pitched sound	صوت غليظ	
Lighthouse	فناار / منارة	
Mayans	شعب المايا	
Mating season	موسم التزاوج	
Morse code	شفرة مورس	
Nurse ants	عاملات النسل	
Pattern	نمط / اسلوب	
Papyrus	نبات البردى	
Pulp	لب الأشجار	
Regular	منتظم	
Receiver	متقبل	
Rescue	إنقاذ	
Representative	مودجي	
Sender	مرسل	
Sailors	البحارة	
Sign language	لغة الإشارة	
Satellites	أقمار صناعية	
Software	برامح الحاسوب الال	
Scout ants	السلك الكثاف	
Soldier ants	جود السل	
Series	سلسلة / متراكمة	
Traffic lights	إشارات المرور الضوئية	
Tower	برج	



# Exercises

## on Lessons of Concept (1.1)

Understand

Apply

Analyze

Evaluate

Create

### Exercises on Lesson 1

#### 1 Choose the correct answer :

- 1. Adaptation helps the living organism in all the following characters, except .....
  - a. surviving.
  - b. reproduction.
  - c. hiding.
  - d. death.
- 2. The starred agama keeps cool during a hot sunny day in desert by .....
  - a. eating green vegetables.
  - b. drinking more water.
  - c. secreting more sweat.
  - d. finding a shade area.
- 3. If a desert lizard is transferred into a cool environment, it will stop .....
  - a. looking for a shade area.
  - b. looking for water to drink.
  - c. breathing.
  - d. eating.
- 4. If you catch a piece of ice in your hand, you will begin to lose feeling in your fingers after a few .....
  - a. minutes.
  - b. hours.
  - c. days.
  - d. weeks.
- 5. Penguins live in a polar climate which .....
  - a. is one of the hottest places on Earth.
  - b. is one of the coldest places on Earth.
  - c. looks like the desert climate.
  - d. looks like the forest climate.
- 6. The presence of an insulating layer of ..... , keep the penguin's body warm.
  - a. protein and thick downy feathers
  - b. fat and thin downy feathers
  - c. fat and thick downy feathers
  - d. protein and thin downy feathers
- 7. In penguin's feet, ..... weave around each other.
  - a. warm blood vessels and cold blood vessels
  - b. warm blood vessels and its toes
  - c. cold blood vessels and its toes
  - d. cold blood vessels and thick downy feathers
- 8. In penguin's body, the insulating layer of fat and thick downy feathers trap ..... against the skin.
  - a. cold air
  - b. cold water
  - c. warm water
  - d. warm air

9. Penguin's feet have blood vessels that bring ..... up from its feet towards its body.  
 a. cold water      b. warm water      c. cold blood      d. warm blood
10. Ecosystem is .....  
 a. a type of adaptation.  
 b. one of human body systems.  
 c. a habitat in which living organisms live.  
 d. a characteristic that helps living organisms survive.
11. Camouflage means that the animal .....  
 a. can be seen easily among its surrounding.  
 b. is hard to be seen among its surrounding.  
 c. is easily to be seen by its preys.  
 d. can be seen easily by its predators.
12. The presence of a thick white fur is an adaptation in .....  
 a. starred agama.      b. polar bear.  
 c. fennec fox.      d. forest bear.
13. Bears that live in forests have fur ..... that of polar bears.  
 a. whiter than      b. darker than  
 c. similar to      d. brighter than
14. Fennec fox and caracal have ..... that help them blend in with desert landscape.  
 a. colorful scales      b. thick white fur  
 c. sandy-colored feathers      d. sandy-colored fur
15. When we wear heavy clothes in winter, this is considered as a type of .....  
 a. adaptation for cold weather.      b. camouflage.  
 c. adaptation for hot weather.      d. ecosystem.
16. Which of the following birds is more difficult to be seen by its predator ? .....  
 a. A red bird on a green tree.      b. A blue bird on a green tree.  
 c. A yellow bird on a green tree.      d. A green bird on a green tree.

## 2 Put (✓) or (✗) :

- 1. The desert lizard blend in with large green trees, to hide from its enemies. ( )
- 2. Animals that live in hot deserts have special ways to keep their bodies warm during hot sunny days. ( )
- 3. Living organisms can survive and reproduce in different environments by the help of adaptation. ( )
- 4. The insulating layer of fat and the thick downy feathers trap warm air against the skin of the penguin's body. ( )

- 5. In penguin's feet, the cold blood vessels can warm up the warm blood vessels. ( )
- 6. Penguin's feet are covered with special type of feathers to keep them warm. ( )
- 7. Camouflage helps animals adapt the extreme weather conditions in their ecosystems. ( )
- 8. Thick white fur is an adaptation in bears that live in polar regions. ( )
- 9. The sandy-colored fur of caracal helps it blend in with snow in polar environment. ( )
- 10. Some types of lizards have colored feathers to help them blend in with rocks in their ecosystem. ( )

**3 Write the scientific term of each of the following :**

- 1. An animal that has a layer of fat and thick downy feathers to adapt extreme cold weather. (.....)
- 2. It covers the body of some type of bears to blend in with snow and keeps its body warm. (.....)
- 3. A type of foxes that has sandy-colored fur to adapt its desert environment. (.....)
- 4. A property that helps animals to blend in with their surrounding environment. (.....)

**4 Complete the following sentences :**

- 1. The penguin's body can keep warm air against its skin through an insulating layer of ..... and thick downy .....
- 2. A penguin can stand around on ice all day due to the weaving of ..... around each other in its feet.
- 3. Animals can blend in with their surrounding environment to hide from their ..... and preys through ..... property.
- 4. Forest bears have ..... or ..... colored fur, while polar bears have ..... colored fur.
- 5. In desert environment, ..... and ..... are covered with sandy-colored fur.
- 6. Among animals that can live in desert ecosystem are ..... lizard and ..... fox.
- 7. The fur of a polar bear is thick to keep its body ..... in polar climate, while it has ..... color to blend in with snow.
- 8. The body of some types of lizards are covered with ..... to blend in with colored rocks in their environment.
- 9. Among animals that can live in polar environment are ..... and .....

**5 Give reasons for :**

- 1. The starred agama lizard always looking for shade areas in desert.
- 2. The blood vessels in the penguin's feet are weave around each other.
- 3. The penguin's body has an insulating layer of fat and thick downy feathers.
- 4. Some animals have the ability to make camouflage adaptation.
- 5. Fennce fox has a sandy-colored fur, while polar bear has a white fur.

**6 What happens if ... ?**

- 1. The warm blood vessels and cold blood vessels in the penguin's feet are not weaved around each other.
- 2. The polar bear has a thin fur instead of its thick fur.
- 3. The body of fennce fox is covered with a black fur.
- 4. Some types of lizards don't have the camouflage adaptation.

**7** Compare between :

- 1.

Points of comparison	Penguin	Fennec fox
1. Habitat :	.....	.....
2. Body coat :	.....	.....

- 2.

Points of comparison	Polar bear	Forest bear
1. Habitat :	.....	.....
2. Fur color :	.....	.....

**8** Read the following dialogue between animal (X) and animal (Y), then answer the questions below :

Animal (X) : Hello, it's very cold today.

Animal (Y) : Hello, in our habitat, all days are always very cold.

Animal (X) : I have to dive now, to find something to eat.

Animal (Y) : I cannot dive but, I just look around to find a prey.

Animal (X) : Ok., good bye.

Animal (Y) : Wait, if I don't find a prey, I will eat you.

- According to the previous dialogue, put (✓) or (✗) in front of the following sentences :

- Both animals (X) and (Y) are penguins. ( )
- Both animals (X) and (Y) live in polar climate. ( )
- Animal (X) is a desert lizard, while animal (Y) is a caracal. ( )
- Animal (X) is covered with thick downy feathers, while animal (Y) is covered with thick white fur. ( )
- Animal (X) is a penguin, while animal (Y) is a forest bear. ( )
- Animal (X) is a penguin, while animal (Y) is a polar bear. ( )

**9** Choose the animals that use camouflage adaptation to blend in with its environment :

a. Deer



b. Frog



c. Cow



d. Lizard

## Exercises on Lesson 2

### 1 Choose the correct answer :

- 1. All of the following sentences represent the meanings of adaptation except .....
  - a. it is the characteristics that help living things survive.
  - b. it is the characteristics that help living things reproduce.
  - c. it is the changes that help the animal to find a prey.
  - d. it is the changes that causes the animal death.
  
- 2. The color of fur of fennec foxes protects them from .....
  - a. wind.
  - b. rains.
  - c. hot Sun.
  - d. cold weather.
  
- 3. Fennec foxes have a tan-colored coat that provides ..... in their environments.
  - a. camouflage
  - b. respiration
  - c. panting
  - d. communication
  
- 4. Panting in fennec foxes belongs to ..... adaptation.
  - a. only structural
  - b. only behavioral
  - c. both structural and behavioral
  - d. neither structural nor behavioral
  
- 5. Fennec foxes and arctic foxes live in burrows, this belongs to ..... adaptation.
  - a. only structural
  - b. only behavioral
  - c. both structural and behavioral
  - d. neither structural nor behavioral
  
- 6. All the following properties help fennec foxes to stay cool except .....
  - a. thick fur coat.
  - b. make panting.
  - c. tan-colored coat.
  - d. extra-large ears.
  
- 7. Changing the color of body coat of arctic foxes according to season, is considered as a type of .....
  - a. behavioral adaptation.
  - b. change to the way of breathing.
  - c. physical adaptation.
  - d. change to the way of drinking.
  
- 8. All the following properties help arctic foxes to stay warm except .....
  - a. thick fur coat.
  - b. short ears.
  - c. tan-colored.
  - d. short legs.
  
- 9. Both fennec foxes and arctic foxes are similar in all of the following except .....
  - a. they are live in the same habitat.
  - b. they can eat different things.
  - c. they have excellent hearing ability.
  - d. they have different sized ears.
  
- 10. Bull sharks can live in .....
  - a. fresh water only.
  - b. salt water only.
  - c. seas, rivers and mud.
  - d. rivers, seas and oceans.

- 11 . From physical adaptation of bull sharks is that they .....
  - a. can live in both salt water and fresh water.
  - b. are flexible about what they eat.
  - c. hunt in the day as well as the night.
  - d. can live in salt water only.
- 12 . When a panther chameleon stands within leaves of trees, the color of its scales changes into ..... color.
  - a. white
  - b. green
  - c. blue
  - d. black
- 13. Special eyes of the panther chameleon are belong to ..... adaptation.
  - a. only structural
  - b. only behavioral
  - c. both structural and behavioral
  - d. neither structural nor behavioral
- 14. .... is considered as a behavioral adaptation in the panther chameleon.
  - a. Puffing up its body during danger
  - b. Each eye can move independently
  - c. V-shaped feet
  - d. Long sticky tongue
- 15 . All the following properties are considered as structural adaptations in the panther chameleon except its .....
  - a. each eye can move independently.
  - b. openning its mouth wide during danger.
  - c. V-shaped feet.
  - d. long sticky tongue.

**2 Choose from column (A) what suits it in both columns (B) and (C) :**

(A) Animal	(B) Adaptation	(C) How helps it
1. Chameleon	a. short ears and leg.	A. stay cool.
2. Fennec fox	b. V-shaped feet.	B. stay warm.
3. Arctic fox	c. difference in body colors.	C. balance and movement.
4. Bull shark	d. panting.	D. hide from its prey.

1. .... → ....

2. .... → ....

3. .... → ....

4. .... → ....

**3 Put (✓) or (✗) :**

- 1. Living organisms can adapt their environmental conditions through structural adaptation and behavioral adaptation. ( )
- 2. Fennec foxes and polar bears are similar in keeping their bodies cool through panting. ( )
- 3. When the snow melts in polar regions, the thick fur coat of arctic foxes turns black. ( )
- 4. The ears of arctic foxes are larger than that of fennec foxes. ( )
- 5. Fennec foxes stay in burrows during day, while arctic foxes stay in burrows during night. ( )
- 6. Both fennec and arctic foxes can eat insects, fruit, plant roots and left overs from other animal's prey. ( )
- 7. All types of sharks live in fresh water. ( )
- 8. Chameleon uses its tail and V-shaped feet to hunt and move. ( )
- 9. The panther chameleon has teeth and claws, through which it can hunt and eat its prey. ( )
- 10. The panther chameleon has a very long sticky tongue to hunt insects for feeding. ( )
- 11. Starred agama lizard use one of its eyes for searching for food and the other one to lookout for danger. ( )
- 12. The polar bear survive and reproduce in the same habitat of panther chameleon. ( )
- 13. Panting and staying in burrows are considered behavioral adaptations in fennec foxes. ( )
- 14. If a bull shark moves from a river to a sea, it will die. ( )

**4 Complete the following table :**

Animal	Its adaptation	Structural or Behavioral adaptation
1. ....	Blood vessels weave around each other.	.....
2. Polar bear	Has thick, white fur.	Structural.
3. ....	Changes the color of its fur.	.....
4. .... fox	Hiding inside burrows to stay cool.	.....
5. Panther chameleon	Has eyes face opposite directions.	.....

**5 Write the scientific term of each of the following :**

- 1. An animal has a tan-colored fur and panting like dogs. (.....)
- 2. A way by which fennec foxes cool themselves like dogs. (.....)
- 3. An animal that changes its fur color between winter and summer seasons. (.....)
- 4. Excellent places for arctic foxes to stay warm at night. (.....)
- 5. An animal that has multiple bright colors to provide camouflage in its environment and has V-shaped feet. (.....)
- 6. A shape of feet by which a panther chameleon holds tightly to branches and vines. (.....)
- 7. A feature in the bull shark, in which the upper surface of its body is darker than its lower surface. (.....)

**6 Complete the following sentences :**

- 1. Tan-colored coat in fennec fox is considered ..... adaptation, while its panting to stay cool is considered ..... adaptation.
- 2. Among animals that live in hot environments are ..... foxes, while ..... foxes live in cold environments.
- 3. Extra-large ears allow heat to escape to cool the bodies of ..... foxes, while short ears and legs help the ..... foxes stay warm.
- 4. Short ears of arctic fox is considered ..... adaptation, while its staying in burrows to be warm is considered ..... adaptation.
- 5. A burrow is an excellent place for the ..... fox to stay warm at night and for the ..... fox to stay cool during the day.
- 6. Different colors in bull shark's body is considered ..... adaptation.
- 7. Weaving of vessels around each other in penguin's feet is considered ..... adaptation.
- 8. The chance of bull shark to find a prey is more easier in ..... water than in ..... water.
- 9. Eyes of chameleon move independently of each other, this adaptation is considered as ..... adaptation.
- 10. Chameleon puffs up its body with air for defense which is considered ..... adaptation, while its V-shaped feet is considered ..... adaptation.
- 11. The mouth of panther chameleon has no ..... , but it has a very long sticky ..... to hunt insects.

**7 Give reasons for :**

- 1. The fennec fox has a tan-colored coat.
- 2. Fennec foxes undergo panting.
- 3. Burrow is an excellent place for arctic and fennec foxes.
- 4. Fennec foxes have large ears, while arctic foxes have short ears.
- 5. Tan-colored coat of fennec fox is considered as a structural adaptation.
- 6. Panting in the fennec fox is considered as a behavioral adaptation.
- 7. Bull sharks have less competition for finding food in fresh water.
- 8. Panther chameleon has a V-shaped feet and a long tail.

**8 What happens if ... ?**

- 1. The arctic fox has a brown coat during the winter but it turns white during summer.
- 2. Fennec foxes have short ears and legs.
- 3. Sense of hearing becomes weak in foxes.
- 4. Arctic fox has only a white coat during all seasons of the year.
- 5. Both eyes of panther chameleon move in one direction only.
- 6. Panther chameleon is exposed to danger.

**9** Cross out the odd word :

1. Penguin – Polar bear – Fennec fox – Arctic fox.
2. Fennec fox – Starred agama lizard – Panther chameleon – Bull shark.
3. Panther chameleon – Polar bear – Fennec fox – Arctic fox.

**10** Compare between :

Points of comparison	Fennec fox	Arctic fox
1. Habitate :	.....	.....
2. Color of fur :	.....	.....
3. Shape of ears :	.....	.....
4. Time of entrance to burrows :	.....	.....

**11** Put (S) in front of structural adaptation and (B) in front of behavioral adaptation  
for each of the following statements :

1. Tan coloration of fennec fox. (.....)
2. Living in burrows according to arctic fox. (.....)
3. Living of bull shark in both salt water and fresh water. (.....)
4. Countershading of bull shark. (.....)
5. Very long sticky tongue of panther chameleon. (.....)
6. Change the colors of panther chameleon scales in danger cases. (.....)

**12** Give only one example of behavioral adaptation in each of the following animals :

- 1. Fennec fox : .....
- 2. Starred agama lizard : .....
- 3. Bull shark : .....
- 4. Panther chameleon : .....

**13** Study the following figure, then answer the questions :

1. What is the name of this animal and where this animal live ?  
.....
2. Why the fur color of this animal changes between summer and winter seasons ?  
.....
3. Mention one structural adaptation and one behavioral adaptation in this animal to adapt with the climate :
  - Structural adaptation :  
.....
  - Behavioral adaptation :  
.....

## Exercises on Lesson 3

### 1 Choose the correct answer :

- 1. Plants have ..... that help them survive and grow in different environments.
  - a. structural adaptation only
  - b. physical adaptation only
  - c. behavioral adaptation only
  - d. physical and behavioral adaptation
- 2. It is difficult for rainforest plants to get .....
  - a. water.
  - b. wind.
  - c. sunlight.
  - d. oxygen.
- 3. From the behavioral adaptation of acacia tree is that .....
  - a. it has one very long root.
  - b. it has sharp spines among its leaves.
  - c. it has very tall trunk.
  - d. it producing poison to make a bad tasty leaves.
- 4. Acacia tree trunk and camel hump, .....
  - a. both store water.
  - b. both store fat.
  - c. the first stores fat, and the second stores water.
  - d. the first stores water, and the second stores fat.
- 5. One of the animals that may eat acacia leaves, is .....
  - a. rat.
  - b. caracal.
  - c. penguin.
  - d. giraffe.
- 6. All the following properties protect acacia leaves from being eaten by animals except that .....
  - a. they are high enough.
  - b. they are guarded by sharp spines.
  - c. they are brightly colored.
  - d. they produce a poison.
- 7. The acacia tree warning the other nearby acacia trees from animals by sending .....
  - a. a watery message in the air.
  - b. a watery message in the water.
  - c. a smelly message in the air.
  - d. a smelly message in the water.
- 8 . When the nearby acacia trees receive the smelly message from the acacia tree, which exposed to be eaten by animals, they .....
  - a. start to lose water from their trunk.
  - b. start to invite bats to eat their leaves.
  - c. start to make a poisonous substance in their leaves.
  - d. start to fall down their leaves.

- 9. Umbrella-shaped tree are .....
  - a. mangrove tree and acacia tree.
  - b. mangrove tree and kapok tree.
  - c. acacia tree and kapok tree.
  - d. barbary fig and water lilies.
- 10. The roots of kapok tree are not planted deeply in the soil, because .....
  - a. the soil contains less water.
  - b. the soil contains more water.
  - c. the climate is very cold.
  - d. the climate is very hot.
- 11. Kapok tree use the wind to carry its fluffy yellow seeds across its .....
  - a. desert habitat.
  - b. snowy habitat.
  - c. salt water habitat.
  - d. rainforest habitat.
- 12. If a plant grows in a dry desert, it needs ..... to adapt for getting water.
  - a. long branches
  - b. long leaves
  - c. long roots
  - d. more sunlight
- 13. If a plant grows in a rainforest, where it is hard to reach sunlight. So, it needs ..... to adapt for getting more sunlight.
  - a. small roots
  - b. a very tall trunk
  - c. sharp spines
  - d. a very short trunk
- 14. If a plant grows in a snow habitat. So, it needs all the following characteristics except ..... to adapt this habitat.
  - a. short branches
  - b. triangular shape
  - c. needle leaves
  - d. wide leaves
- 15. All the following are adaptation of different plants to keep animals away from them except that they .....
  - a. produce poison.
  - b. gather their branches high above.
  - c. have delicious-smelling flowers.
  - d. have sharp spines.
- 16. Desert plants are characterized by all the following except that they .....
  - a. store water.
  - b. have wide leaves.
  - c. have long roots.
  - d. have sharp spines.
- 17. Palm tree has a tiny leaves like .....
  - a. pine tree.
  - b. kapok tree.
  - c. acacia tree.
  - d. water lily plant.
- 18. From the structural adaptation of water lily plant is that .....
  - a. it has long roots.
  - b. it has sharp spines.
  - c. it has tiny leaves.
  - d. it has wide leaves.

- 19. Pine tree has a triangular shape to make snow slides over its branches without breaking it. This structural adaptation makes this tree face the extreme cold climate like the feet of .....
  - a. caracal.
  - b. penguin.
  - c. fennec fox.
  - d. brown bear.
- 20. Barbary fig keeps animals away like acacia trees by its .....
  - a. sharp spines.
  - b. poison.
  - c. smell.
  - d. long leaves.

**2 Choose from column (B) what suits it in column (A) :**

- 1.

(A)	(B)
1. Hand-shaped leaves	a. carries the kapok tree's fluffy yellow seeds across the forest.
2. Wind	b. make kapok tree easy to find water.
3. Buttress roots	c. allow wind to move more gently through the leaves of kapok tree.
	d. help kapok tree stays upright in soggy soil.

1. .... 2. .... 3. ....

- 2.

(A)	(B)
1. Long and strong roots	a. prevent animals from eating barbary fig.
2. Wide leaves	b. make mangrove tree resists the water waves.
3. Needle shaped leaves	c. allow snow slides easily over pine tree.
4. Sharp spines	d. allow water lilies absorb large amount of sunlight.
	e. prevent lossage of water in pine tree.

1. .... 2. .... 3. .... 4. ....

**3 Put (✓) or (✗) :**

- 1. The rain falls for 6 months in southern African Savannah. ( )
- 2. Acacia tree has tiny leaves growing at the top of its taproot. ( )
- 3. The taproot of acacia tree grows deeply downward searching for water. ( )
- 4. Acacia leaves are protected from eaten by animals as they have brightly colored leaves. ( )
- 5. Acacia tree has long roots to hold it securely in the soil. ( )
- 6. Acacia tree and kapok tree used wind to send messages. ( )

- 7. Kapok tree has hand-shaped leaves. ( )
- 8. Sunlight transfers kapok tree's fluffy yellow seeds across the rainforest. ( )
- 9. From the structural adaptation of acacia tree is that it has a large, wide roots called buttress roots. ( )
- 10. Mangrove trees adapt to resist the water waves through their long, strong leaves. ( )
- 11. Water lily has wide leaves to absorb a large amount of sunlight. ( )
- 12. Pine trees live in desert habitat, adapt by having needle leaves to prevent losing of water. ( )
- 13. Thick roots are behavioral adaptation of palm trees to resist strong winds. ( )
- 14. Animals can't eat barbary fig due to its sharp spines. ( )
- 15. Plants of dry desert habitat adapt to store water. ( )
- 16. Sharp spines are adaptation of different plants to prevent animals from eating them. ( )

#### 4 Write the scientific term of each of the following :

- 1. Structural adaptation of acacia tree that allows it to search for water. (.....)
- 2. Structural adaptation that guard the leaves of acacia tree to prevent animals from eating them. (.....)
- 3. Structural adaptation that fix the kapok tree in soggy soil and support its trunk. (.....)
- 4. The part of the kapok tree which is supported by the buttress roots. (.....)
- 5. A plant lives in salt water habitat and has long, strong roots to resist the water waves. (.....)
- 6. A plant lives in wet land habitat and has wide leaves to absorb a large amount of sunlight. (.....)
- 7. Structural adaptation in water lilies that absorb large amount of sunlight.(.....)
- 8. Structural adaptation that prevent the loss of water in pine tree. (.....)

#### 5 Complete the following sentences :

- 1. Acacia tree defending itself by producing ..... that makes leaves taste terrible while chameleon defending itself by puffing up its ..... with air.
- 2. The leaves of ..... tree in hot weather habitat store water, while the needle leaves of ..... tree in snowy habitat prevent the loss of water.
- 3. The leaves of ..... tree are look like your hand.
- 4. The shape of the kapok leaves allows ..... to flow through them smoothly.
- 5. The kapok tree spreads the smell of its flowers to attract ..... towards it.
- 6. Among the plants that can survive in habitats that have lackage of water are ..... , ..... and .....

- 7. Leaves of water lilies are wide in order to ..... on the water surface and to absorb a large amount of .....
- 8. Drought regions are characterized by lacking of ..... so, their plants adapt by having very long .....
- 9. The structural adaptation of ..... tree can resist water waves, while the structural adaptation of ..... tree can resist strong winds.
- 10. The structural adaptation of the leaves of ..... plant allows it absorbs large amount of sunlight, while the structural adaptation of the leaves of ..... tree allows wind to move easily through the leaves without tearing them.

### 6 Give reasons for :

- 1. Branches of acacia tree are gather on the top of its trunk.

.....  
.....

- 2. Acacia tree have sharp spines.

.....  
.....

- 3. Wind is important to acacia trees.

.....  
.....

- 4. Kapok tree has hand-shaped leaves.

.....  
.....

- 5. Kapok trees stay firmly rooted in the soggy soil although they are very tall.

.....  
.....

- 6. Pine tree have a triangular shape.

.....  
.....

- 7. Although snow falls in large quantities on the pine tree, its branches do not break easily.

.....  
.....

- 8. Water lilies can absorb large amount of sunlight.

.....  
.....

- 9. Palm trees can resist strong winds.

- 10. Barbary fig has sharp spines.

**7 What happens if ... ?**

- 1. The length of acacia taproot doesn't exceed 3 meters downward.

- 2. The acacia leaves are not guarded by sharp spines.

- 3. There are no buttress roots in the kapok tree.

- 4. The pine tree had an umbrella shape not a triangle shape.

- 5. Some plants of rainforest habitat became very short.

**8 Cross out the odd word :**

- 1. Taproot – Tiny leaves – Savannah – Buttress roots – Producing a poison.

- 2. Rainforest – Taproot – Hand-shaped leaves – Soggy soil – Buttress roots.

- 3. Cactus plant – Barbary fig – Palm tree – Mangrove tree.

- 4. Acacia tree – Polar bear – Penguin – Pine tree.

**9** Compare between :

- 1.

Points of comparison	Acacia tree	Kapok tree
1. Type of roots :	.....	.....
2. Shape of leaves :	.....	.....

- 2.

Points of comparison	Kapok tree	Water lily	Pine tree
1. Habitat :	.....	.....	.....
2. Shape of leaves :	.....	.....	.....

**10** Read the following paragraphs, then correct the underlined words :

- 1. Water lilies live in desert habitat so they have wide roots that float on the water surface to absorb large amount of water.
- .....

- 2. Plants of desert habitat have thick and short roots to resist the strong water waves and search for water such as pine trees and barbary fig plant.
- .....

- 3. Pine trees live in Savannah habitat, so they have long branches and needle leaves which prevent the plant from losing of sunlight.
- .....

**11** Classify the following living organisms according to their habitat into organisms

- live in deserts and organisms live in forests in the table below :

(Starred agama lizard – Panther chameleon – Fennec fox – Kapok tree – Palm tree – Barbary fig plant)

Organisms live in deserts	Organisms live in forests
.....	.....
.....	.....
.....	.....
.....	.....

**Exercises on Lesson****4****1 Choose the correct answer :**

- 1. The needed energy to perform different functions of a living organism is obtained from .....
  - a. breathing only.
  - b. food processing only.
  - c. breathing and running.
  - d. breathing and food processing.
  
- 2. All the following are organs in the digestive system except .....
  - a. mouth.      b. nose.      c. stomach.      d. esophagus.
  
- 3. The stomach lies between esophagus and .....
  - a. mouth.      b. large intestine.    c. small intestine.    d. anus.
  
- 4. Which of the following organs is not included in breaking down of food? .....
  - a. Mouth.      b. Stomach.      c. Lungs.      d. Small intestine.
  
- 5. The role of teeth in digestion process is .....
  - a. mixing the food.                          b. crushing the food.
  - c. swallowing the food.                          d. moistening the food.
  
- 6. Crushing the food in your mouth is a function of .....
  - a. stomach.      b. tongue.      c. saliva.      d. teeth.
  
- 7. All the following are correct about the mouth except .....
  - a. it is the first organ in the digestive system.
  - b. it has teeth.                                  c. it has tongue.
  - d. it moves food to the stomach directly.
  
- 8. In the ...., saliva moistens food and begins to break it down.
  - a. mouth      b. esophagus      c. small intestine    d. stomach
  
- 9. Saliva in the mouth makes the food becomes soft and mushy with the help of .....
  - a. teeth only.                                  b. tongue only.
  - c. teeth and esophagus.                          d. teeth and tongue.
  
- 10. The throat is connected to the stomach through .....
  - a. esophagus.    b. trachea.    c. small intestine.    d. large intestine.
  
- 11. The organ that moves the food into the stomach is .....
  - a. mouth.      b. tongue.      c. esophagus.      d. small intestine.

- 12. The food passes from the stomach to ..... in order to complete the digestion process.
  - a. esophagus b. small intestine c. large intestine d. anus
- 13. The stomach mixes the food with .....
  - a. digestive juices only. b. stomach acid only.
  - c. saliva and digestive juices. d. stomach acid and digestive juices.
- 14. The acid present in the stomach helps in .....
  - a. absorption of digested food quickly. b. digestion of food.
  - c. absorption of water from undigested food. d. crushing of food.
- 15. The liver and ..... pour their juices into the small intestine.
  - a. throat b. esophagus c. large intestine d. pancreas
- 16. Juices from liver and pancreas flow into .....
  - a. mouth. b. stomach. c. small intestine. d. large intestine.
- 17. The organ that is long winding tube its length is about more than six meters is called .....
  - a. large intestine. b. small intestine.
  - c. esophagus. d. stomach.
- 18. The undigested materials of the food pass from the small intestine into .....
  - a. the liver. b. the pancreas.
  - c. the brain. d. the large intestine.
- 19. In the large intestine ..... is absorbed from the undigested food.
  - a. starch b. fats c. water d. oil
- 20. The solid wastes of undigested food become useless to the body, so the body must expel it outside the body through the .....
  - a. mouth. b. small intestine.
  - c. large intestine. d. anus.
- 21. The following pieces of advice keep the digestive system healthy except .....
  - a. chewing food well.
  - b. avoid eating much fast meals.
  - c. drinking a little amount of water.
  - d. practicing sports regularly.
- 22. Meat is much easier to be processed, so dogs have .....
  - a. more than one stomach and a short digestive system.
  - b. only one stomach and a short digestive system.
  - c. more than one stomach and a long digestive system.
  - d. only one stomach and a long digestive system.

- 23. The passage of air during inhalation is .....
  - a. throat – nose – lungs – trachea.
  - b. trachea – throat – lungs – nose.
  - c. lungs – nose – throat – trachea.
  - d. nose – throat – trachea – lungs.
- 24. The throat is connected to the lungs through .....
  - a. esophagus.    b. trachea.    c. small intestine.    d. ribs.
- 25. Inside the two lungs, at the end of the smaller air passages (bronchioles) there are tiny air sacs surrounded by .....
  - a. air.    b. water.    c. small intestine.    d. blood vessels.
- 26. The oxygen gas moves from air into blood at the .....
  - a. nose.    b. throat.    c. trachea.    d. lungs.
- 27. All the following are methods to keep the respiratory system healthy except .....
  - a. breathing clean air.    b. eating fruits rich in vitamin (A).
  - c. eating orange and guava.    d. avoid the smoking and smoking areas.

## 2 Choose from column (B) what suits it in column (A) :

- 1.

(A)	(B)
1. Esophagus	a. absorbs water from the undigested food to become solid waste.
2. Small intestine	b. mixes the food with an acid and digestive juices.
3. Large intestine	c. the digestion begins in it.
4. Stomach	d. food gets completely digested in it.
5. Mouth	e. is a tube has muscles that move the food down into the stomach.
	f. solid waste leaves the body through it.

1. .... 2. .... 3. ....
4. .... 5. ....

• 2.

(A)	(B)
1. Trachea	a. is a large muscle at the base of the ribs that help in process of exhaling and inhaling.
2. Blood	b. are like balloons and they contain little sacs surrounded by blood vessels.
3. Diaphragm	c. carrying the oxygen to all body organs.
4. Lungs	d. is a tube that air travel down into the lungs through it.
	e. air enters the body through them.

1. .... 2. .... 3. .... 4. ....

**3 Put (✓) or (✗) :**

- 1. All animals are similar in shape and structure of their digestive systems. ( )
- 2. The digestive system consists of similar organs that work together to get nutrients from food. ( )
- 3. The human body gets oxygen gas from food. ( )
- 4. Mouth, nose, esophagus and the stomach are from the organs of the digestive system. ( )
- 5. The food passes through the large intestine before it goes into the small intestine. ( )
- 6. Digestion process begins in stomach with the help of saliva. ( )
- 7. The tongue and teeth moisten the food, while saliva crushes the food until it becomes soft. ( )
- 8. Food passes from mouth to stomach through a narrow tube known as small intestine. ( )
- 9. Food usually stays in stomach for few hours until it becomes a soupy liquid. ( )
- 10. Stomach connects esophagus with large intestine. ( )
- 11. Stomach mixes the food with juices that come from liver and pancreas. ( )
- 12. The food gets broken down into nutrients in the small intestine. ( )
- 13. Nutrients enter tiny blood vessels then blood carries them to all the parts of the body. ( )
- 14. Swallowing food without chewing keeps the digestive system healthy. ( )
- 15. Digestive system ends by anus. ( )
- 16. Grass is very easy to be digested. ( )

- 17. Dogs eat meat which is much easier to be digested, so dogs have short digestive system. ( )
- 18. During running the rate of breathing decreases. ( )
- 19. The air travels down into the lungs through esophagus. ( )
- 20. The inhaled air is rich in carbon dioxide gas, while the exhaled air is rich in oxygen gas. ( )
- 21. Exposing to air rich in dust harms the respiratory system. ( )

**4 Write the scientific term of each of the following :**

- 1. The organ where saliva moistens the food. (.....)
- 2. It presents in mouth and play an important role in crushing of food. (.....)
- 3. Liquid substance in your mouth that moistens the bite of food and begins to break it down. (.....)
- 4. The organ which receives the food from esophagus. (.....)
- 5. An organ that has tiny blood vessels to absorb the nutrients through its walls. (.....)
- 6. An organ through which solid wastes of digestion leaves the body. (.....)
- 7. A process through which the body gets oxygen from the air and expels out carbon dioxide. (.....)
- 8. A large muscle that contracts during breathing in and relaxes during breathing out. (.....)

**5 Complete the following sentences :**

- 1. The human body use ..... system to get nutrients from food and use ..... system to get oxygen from air.
- 2. The role of saliva in digestion process is .....
- 3. In order for food to become soft the ..... and ..... work to mix and grind (crush) the food well.
- 4. In the digestive system food becomes a soupy liquid in the ..... , while it breaks down into nutrients in .....
- 5. The ..... is a tube that has muscles to move the food down into the stomach, while ..... is a long winding tube that the food gets completely digested inside it.
- 6. The longest part of the digestive system where most digestion takes place inside it is .....
- 7. The small intestine receives juices from ..... and ..... that help in digestion process.

- 8. The wall of the small intestine absorbs the digested food into your bloodstream through .....
- 9. In the digestive system, ..... intestine absorbs the nutrients through its wall, while ..... intestine absorbs water from undigested materials.
- 10. The ..... formed in the large intestine are expelled out of the body through anus.
- 11. Cows have ..... stomach - like organs in their digestive system for digestion of .....
- 12. Dogs have a ..... digestive system than cows in length.
- 13. Air enters and exits the human body through ..... system.
- 14. During inhalation, air travels down from your throat to your lungs through .....
- 15. At the base of your ribs there is a large muscle that plays an important role in respiration process known as .....
- 16. During inhalation process the diaphragm contracts and moves ..... , while during exhalation process the diaphragm expands and moves .....

### 6 Give reasons for :

- 1. The human body is made up of different systems.
- .....  
.....

- 2. Although food is not digested inside the anus, it is an important organ in the digestive system.
- .....  
.....

- 3. A cow has long digestive system with lots of stomach-like compartments.
- .....  
.....

- 4. A dog has only one stomach and a much shorter digestive system than that of a cow.
- .....  
.....

- 5. Diaphragm has a great importance in respiration process.
- .....  
.....

**7** What happens if ... ?

1. The small intestine is removed from the human body.

.....  
.....

2. The nutrients absorbed by the wall of small intestine enters the tiny blood vessels.

.....  
.....

3. Cows have sharp teeth and a short digestive system.

.....  
.....

4. The diaphragm moves downward during inhalation.

.....  
.....

5. The diaphragm moves upward during exhalation.

.....  
.....

**8** Cross out the odd word :

- 1. Saliva – Stomach – Esophagus – Small intestine. (.....)
- 2. Mouth – Lungs – Stomach – Large intestine. (.....)
- 3. Nose – Throat – Trachea – Anus. (.....)
- 4. Cow – One stomach – Dog – Sharp canine teeth. (.....)

**9** Using the following table mention the name of the tube-shaped organs of the digestive and respiratory systems inside our bodies :

(A)	(B)
Organ (1) .....	through which food passes to the stomach.
Organ (2) .....	in which the absorption of nutrients takes place.
Organ (3) .....	it ends with anus.
Organ (4) .....	it connects the throat with the two lungs.

**10 Compare between :**

- 1.

Points of comparison	Inhalation	Exhalation
1. Diaphragm movement :	.....	.....
2. Size of chest cavity :	.....	.....
3. The air is rich in :	..... gas.	..... gas.

- 2.

Points of comparison	Cows	Dogs
1. Type of food :	.....	.....
2. Type of teeth :	.....	.....
3. Number of stomachs :	..... Stomach-like organs.	.....
4. Length of digestive system :	.....	.....

**11 Put (✓) in front of the name of the system to which each of the following organs belongs :**

The organ	The system	
	Digestive	Respiratory
1. Trachea	.....	.....
2. Anus	.....	.....
3. Stomach	.....	.....
4. Lungs	.....	.....
5. Small intestine	.....	.....
6. Esophagus	.....	.....
7. Diaphragm	.....	.....
8. Nose	.....	.....
9. Large intestine	.....	.....
10. Liver	.....	.....
11. Pancreas	.....	.....

**12** Mention the name of each organ, then complete the sentences below :

1. ....

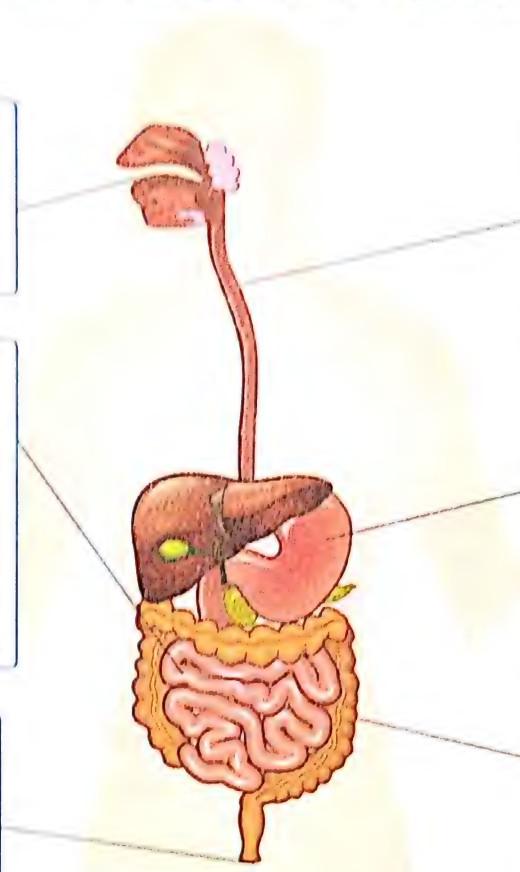
- It has ..... that moistens the food.

4. ....

- It receives juices from ..... and ..... which help break down of food into .....

6. ....

- It helps the body to get rid of solid .....



2. ....

- It is a tube that moves the food down into .....

3. ....

- It mixes food with the ..... acid and ..... juices.

5. ....

- It absorbs ..... from ..... food.

**13** The following figures represent the respiratory system :

(1) Which figure represents

inhalation. (.....)

(2) Which figure represents

exhalation. (.....)

(3) In figure (a) ..... muscle

contracts and the size of chest .....

(4) The air that comes out in

figure (b) is rich in ..... gas.

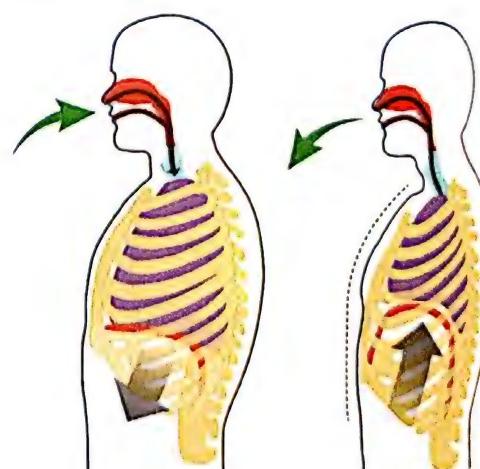


Fig. (a)

Fig. (b)

## Exercises on Lesson 5

**1 Choose the correct answer :**

- 1. Both of human and fish .....
  - a. can breathe in air.
  - b. can breathe in water.
  - c. use oxygen gas to breathe in.
  - d. use carbon dioxide gas to breathe in.
- 2. Fish use ..... to breathe in water.
  - a. tail
  - b. eyes
  - c. lungs
  - d. gills
- 3. Gills differ from lungs, in that gills .....
  - a. take in oxygen gas.
  - b. expel out carbon dioxide gas.
  - c. extract oxygen gas from water.
  - d. extract oxygen gas from air.
- 4. Gills in fish are considered as .....
  - a. behavioral adaptation.
  - b. structural adaptation.
  - c. camouflage adaptation.
  - d. behavioral and structural adaptation.
- 5. Changes that occur slowly to the environment, .....
  - a. cause many organisms to die.
  - b. cause many organisms to respire.
  - c. cause many organisms to disappear.
  - d. give a chance to the organisms for adaptation.
- 6. Rapid changes that occur to the ecosystem, done by .....
  - a. arctic foxes.
  - b. starred agama.
  - c. human activities.
  - d. animal activities.
- 7. Human can negatively affect the nature by all of the following activities, except .....
  - a. cutting down forests.
  - b. throwing wastes in waterways.
  - c. plowing grasslands.
  - d. removing air pollutants.
- 8. Human activities and bad habits, can pollute ..... of an ecosystem.
  - a. air and soil only
  - b. soil and waterways only
  - c. air and waterways only
  - d. air, soil and waterways
- 9. Pollution of an ecosystem, can affect .....
  - a. plants and animals only.
  - b. animals and humans only.
  - c. humans and plants only.
  - d. plants, animals and humans.
- 10. If an ecosystem is severely polluted, some animals can survive .....
  - a. by increasing the rate of breathing.
  - b. by decreasing the rate of breathing.
  - c. by increasing the rate of heart beats.
  - d. by moving to another suitable ecosystem.

- 11. If the environment is slowly changed, plants
  - a. must have a taproot
  - b. must have buttress roots
  - c. must decrease their adaptation
  - d. must land their seeds in another better place
- 12. Wildfires is most dangerous for plants rather than animals, because
  - a. plants can grow rapidly.
  - b. animals can grow easily.
  - c. plants cannot move at all.
  - d. animals can adapt with fires.
- 13. When the air pollution is high over a long period of time, ..... may occur to human.
  - a. lung damages and wounds
  - b. asthma and wounds
  - c. heart problems and wounds
  - d. lung damages and asthma
- 14. Human can help restoring ecosystem by all of the following activities, except
  - a. replanting the cleared forests.
  - b. removing air and water pollutants.
  - c. producing more factories exhaust.
  - d. preserving existed plants and animals.

## 2 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Changes that done by human and may harm existed birds in an ecosystem.	a. building more factories that produce more smog inside cities.
2. Change that done by human and causes air pollution.	b. rainfall, floods and severe weather events.
3. Changes that done by human and can restore air in an ecosystem.	c. replanting the cleared forests and removing of air pollutants.
4. ....	d. plowing grasslands and cutting down forests.

1. ....

2. ....

3. ....

## 3 Put (✓) or (✗) :

- 1. Human breathes using gills, while fish breathes using lungs. ( )
- 2. Gills are found on one side of a fish's head. ( )
- 3. Both of lungs and gills take carbon dioxide gas inside the body and release oxygen gas outside the body. ( )

- 4. Gills are unique physical adaptation that allow fish to live and breathe under water. ( )
- 5. As human needs clean water to drink, fish needs clean air to breathe. ( )
- 6. Organisms have no chance to adapt, if the environmental changes are rapidly. ( )
- 7. When an ecosystem is slowly changed, many organisms may die or even become extincted. ( )
- 8. Cutting down rainforests, may causes disappearance of starred agama. ( )
- 9. Nature cannot change an ecosystem rapidly. ( )
- 10. Wildfires and floods are natural changes that may occur to an ecosystem. ( )
- 11. Throwing waste materials in waterways is one of the bad habits, that must be stopped. ( )
- 12. The way of survival of animals differ from that of plants, if the ecosystem is rapidly changed. ( )
- 13. Pollution is one of the most dangerous problems, that affect all living organisms. ( )
- 14. Respiratory problems like lung damage and asthma, occur when water pollution is high over a long period of time. ( )
- 15. Humans can restore ecosystem as well as they can harm them. ( )
- 16. When the pollution level in a city is very high, people are forced to change their lifestyle. ( )
- 17. Both human and fish need food and oxygen to get energy. ( )

#### 4 Correct the underlined words :

- 1. Fish use gills to take carbon dioxide gas out of the water. ( \_\_\_\_\_ )
- 2. Fins in fish are found under skinny flaps that open and close. ( \_\_\_\_\_ )
- 3. Air enters the mouth of a fish and then passes across the gills. ( \_\_\_\_\_ )
- 4. Blood vessels of lungs and gills are similar in carrying carbon dioxide gas to all the parts of the body. ( \_\_\_\_\_ )
- 5. Gills are unique behavioral adaptations that allow fish to breathe under water. ( \_\_\_\_\_ )
- 6. If an ecosystem is slowly changed, living organisms may have no chance to survive. ( ..... )
- 7. Plowing grasslands is one of the natural changes, which cause severe damage to the agricultural fields. ( ..... )
- 8. Both factories exhausts and floods are producing smog, that causes air pollution. ( ..... )
- 9. When an ecosystem is severely polluted, animals only are affected. ( ..... )

**5** Write the scientific term of each of the following :

- 1. A structure that allows fish to breathe under water. (.....)
- 2. A natural change that causes burn of forests trees and grasslands. (.....)
- 3. A gas that present in air and water, and is very important for breathing process. (.....)
- 4. A gas which the human and fish bodies must get rid of during exhalation process. (.....)
- 5. The environment in which fish live, and as it is clean the fish stay healthy. (.....)
- 6. A human activity that done to obtain woods for making furniture. (.....)

**6** Complete the following sentences :

- 1. Human use lungs to breathe, while fish use .....
- 2. In both human and fish, ..... carry oxygen gas to all parts of the body.
- 3. Gills of fish are considered as ..... adaptations, that allow fish to breathe under water.
- 4. Building new communities, may cause many organisms to .....
- 5. Slow changes to the ecosystem usually done by nature, while rapid changes done by .....
- 6. Among natural changes that occur to an ecosystem, wind, floods and .....
- 7. Human activities and bad habits can pollute air, soil and ..... of an ecosystem.
- 8. All living organisms including humans, animals and plants are affected negatively by .....
- 9. One of air pollutants that makes human hard to breathe, is .....
- 10. When air pollution is very high over a long period of time, it may causes lungs damage, ..... and heart problems to the humans.
- 11. Humans can ..... the cleared forests, to restore the ecosystem.

**7** Give reasons for :

- 1. Gills is a unique structural adaptations in fish.

- 2. Changes that occur rapidly to the ecosystem is more dangerous for the living organisms, than slow changes.

- 3. Cars and factories exhaust cause breathing problems.

- 4. Sometimes people in big cities are forced to change their lifestyle.

- 5. It is very dangerous to live in an ecosystem that has a high level of air pollution.

### 8 What happens if ... ?

- 1. Humans have gills and also have lungs.

- 2. The ecosystem is slowly changed. (according to survival of the living organisms)

- 3. The ecosystem is rapidly changed. (according to survival of the living organisms).

- 4. Human activities and bad habits increases.

- 5. Cars and factories exhaust increases in big cities.

- 6. Human doesn't introduce new plants, animals and diseases to an ecosystem.

7. Pollution increases in water (for human and fish).

**9 Explain the role of each of the following in respiration process :**

- 1. Gills in fish.
  
- 2. Lungs in human.
  
- 3. Blood vessels.

**10 Look at the following photos, then answer the questions :**

- 1. The opposite photo represents dead fish, this may happen due to .....
  - a. wildfires.
  - b. soil pollution.
  - c. water pollution.
  - d. cutting forests.
  
- 2. In your opinion, the air pollution in the opposite photo, may cause .....
  - a. water pollution only.
  - b. soil pollution only.
  - c. water and soil pollutions.
  - d. cutting forests.



**11 Read the following paragraph, then answer the questions below :**

As humans change ecosystems negatively, they can also help restore ecosystems through replanting the cleared forests, removing air and water pollutants and preserving existed plants and animals.

- (1) From the previous paragraph, write the ways through which human can restore ecosystems.
  
- (2) Write another way through which human also can restore ecosystem.

## Exercises on Lesson 6

### 1 Choose the correct answer :

- 1. Amphibians live in ..... that suits its adaptation.
  - a. dry environment
  - b. moist environment
  - c. arctic environment
  - d. sandy environment
- 2. Starred agama and salamanders, .....
  - a. both are reptiles.
  - b. both are amphibians.
  - c. the first is reptile, while the second is amphibian.
  - d. the first is amphibian, while the second is reptile.
- 3. If amphibians have gills not lungs and cannot respire through skin, then .....
  - a. they cannot live outside water.
  - b. they can live outside water.
  - c. they cannot live underwater.
  - d. they can live in desert landscape.
- 4. Amphibians can take in oxygen gas from .....
  - a. water only.
  - b. air only.
  - c. food and air.
  - d. water and air.
- 5. In rainforests, we can find .....
  - a. panther chameleon and arctic foxes.
  - b. amphibians and fennec foxes.
  - c. arctic foxes and fennec foxes.
  - d. panther chameleon and amphibians.
- 6. Golden frog and polar bear, .....
  - a. both live in the same habitat.
  - b. both can breathe in water.
  - c. both have the same body coat.
  - d. both are living organism.
- 7. If the number of an animal species becomes zero due to severe changes in its natural habitat, this means that this species .....
  - a. becomes endangered.
  - b. becomes extinct.
  - c. will survive.
  - d. going to be extinct.
- 8 . Both humans and amphibians breathe in oxygen. Which of the following sentences is correct ? .....
  - a. Both can breathe oxygen gas from water.
  - b. Both can take in oxygen gas through skin.
  - c. Humans can breathe oxygen gas from water and air.
  - d. Amphibians can breathe oxygen gas in air and water.

9. Blood vessels that carry oxygen gas in amphibians, present in .....  
a. skin and digestive system.  
b. lungs and eyes.  
c. digestive system and eyes.  
d. skin and lungs.
- 10 . Amphibians, lizards, trees, birds, fish and humans .....  
a. some of them need oxygen gas to respire.  
b. some of them need carbon dioxide gas to respire.  
c. all of them need oxygen gas to respire.  
d. all of them need carbon dioxide gas to respire.
- 11 . Amphibians extract ..... directly from water, to obtain energy.  
a. green grass  
b. fish wastes  
c. oxygen gas  
d. carbon dioxide gas
- 12 . To increase the number of an endangered species, you may have to .....  
a. introduce a new predator for this species.  
b. introduce a disease that causes death for this species.  
c. introduce a plant that causes harms for this species.  
d. introduce a new prey for this species.
13. If a pond where some frogs live, is highly polluted with wastes and viruses.  
What you have to do to preserve these frogs ? .....  
a. Fill in pond with sand.  
b. Dry this pond from water.  
c. Supply this pond with more oxygen gas.  
d. Transfer these frogs to a clean water habitat.
14. To help some green frogs to increase their ability to hide from their predators,  
you can ..... in their environment.  
a. cultivate more green plants  
b. fill in the ponds with sand  
c. transfer these frogs to a safe desert habitat  
d. transfer these frogs to a safe polar habitat

**2** Choose from column (A) what suits it in both columns (B) and (C) :

(A) Living organisms	(B) Species	(C) Habitats
1. Bull shark	a. reptile	A. savannah
2. Starred agama	b. amphibian	B. salt and fresh water
3. Acacia	c. fish	C. wet environment
4. Frog	d. plant	D. desert environment

1. .... → ....

2. .... → ....

3. .... → ....

4. .... → ....

**3** Put (✓) or (✗) :

- 1. Amphibians includes frogs, starred agama and salamanders. ( )
- 2. The natural habitat of amphibians is rainfall forests, while that of panther chameleon is desert. ( )
- 3. The number of amphibians increases in the last few years, due to restoring of its ecosystem. ( )
- 4. Arctic foxes and amphibians cannot found in the same habitat. ( )
- 5. Frogs have a small digestive system as they are small reptiles. ( )
- 6. Salamanders and fish can breathe in air through lungs. ( )
- 7. In the habitat of amphibians, we can find some types of reptiles. ( )
- 8. Scientists try to save golden frogs, as they are going to be extinct animals. ( )
- 9. Amphibians may suffer from habitat loss or even die, if its ecosystem is full of pollution. ( )
- 10. Clean water and air are very important for digestion process in amphibians. ( )
- 11. You have to advice people to avoid throwing wastes in water ways to save amphibians' life. ( )

**4** Write the scientific term of each of the following :

- 1. A species that includes frogs, toads and salamanders. (.....)
- 2. The organ through which salamanders can take in oxygen gas directly from water. (.....)
- 3. A gas that is present in water and air, and supply amphibians with energy. (.....)
- 4. The type of adaptation that allows frog to take in oxygen gas from water directly through the skin. (.....)

- 5. An organ that is responsible for breathing and contains little sacs, in humans, frogs, cows but not in fish.
- 6. An additional breathing property that amphibians have, and not present in human.

### 5 Complete the following sentences :

- 1. Starred agama lizard is a ..... , while frog is an amphibian.
- 2. As humans, amphibians need ..... and ..... to obtain energy.
- 3. Humans, amphibians and reptiles have ..... to breath oxygen gas in air.
- 4. Bull shark can respire through ..... only, while salamander can respire through ..... and .....
- 5. Humans and amphibians are similar, as both of them have no ..... that present in fish for respiration.
- 6. As the pollution rate of water in ponds and air increases, the number of amphibians .....
- 7. Amphibians have two ways to breathe oxygen, one from air through ..... and the other from water through .....
- 8. As humans, amphibians lungs have ..... surrounded by blood vessels to take in oxygen gas from air.
- 9. Amphibians cannot live in the natural habitat of penguins, because the skin of amphibians doesn't covered with .....
- 10. The ability of amphibians to take in oxygen gas from water through the skin, is considered as ..... adaptation.
- 11. All living organisms, breath oxygen gas and gives ..... as a waste product.
- 12. Pollution of ..... and ..... may cause a big problem on the amphibians survival.

### 6 Correct the underlined words :

- 1. Fish can breath only in air. (.....)
- 2. Amphibians live in dry environments. (.....)
- 3. Starred agama is a reptile, while frog is a lizard. (.....)
- 4. Amphibians have gills as well as humans for respiration. (.....)
- 5. Amphibians can take in carbon dioxide from air for respiration. (.....)
- 6. In rainforests, we can find panther chameleon and arctic fox. (.....)
- 7. Reptiles have two different ways for breathing. (.....)
- 8. Humans and frogs can breathe oxygen in water. (.....)
- 9. Golden frog is an extinct species. (.....)

**7** Give reasons for :

- 1. Amphibians need food and water.
- 2. Starred agama and golden frog are two different species.
- 3. Golden frog is an endangered species.
- 4. Skin of fish is different from that of frog, although both of them live in water.
- 5. Dry seasons is very harmfull for amphibians.
- 6. Pollution of air and water can affect the survival of amphibians.
- 7. Scientists must study how amphibians interact with their environment.

**8** What happens if ... ?

- 1. Pollution level increases in the natural habitat of amphibians.
- 2. The ecosystem of amphibians is containing clean air and water.
- 3. Amphibians have gills only to breathe.

4. The number of predators of amphibians increases.

.....

5. Humans introduce plants, predators and viruses to the ecosystem of amphibians.

.....

6. Rainforests suffer from seasons of dryness on the lifestyle of amphibians.

.....

7. Salamanders have lungs only to respire.

.....

8. Skin of frogs becomes dry.

Look at the following two pictures, then answer the questions [by writing habitat (A) or habitat (B)]:



Habitat (A)



Habitat (B)

1. Starred agama lizard and fennec fox live in .....
2. We can find panther chameleon in .....
3. Amphibians cannot live in .....
4. Yellow body coats is most common in .....
5. Dry seasons is more dangerous for .....
6. Cutting down forest usually occurs in .....
7. The suitable ecosystem for barbary fig is .....
8. Caracals can live in .....
9. Arctic foxes cannot be found in .....
10. Kapok trees can grow in .....

**10** Read the following paragraph, then answer the questions :

Mountainous land in China is the natural habitat of panda bears, where bamboo plants grow extensively. Panda depends mainly on the bamboo plants in its feeding. Panda is one of the endangered animals all around the world. Cutting down bamboo plants decreases panda food source, and this beside hunting by local people cause a great harm on panda survival.



Put (✓) in front of right statements and (✗) in front of wrong ones :

- (1) Panda is an endangered species, due to cutting down bamboo and hunting. ( )
- (2) The body coat of panda is fur like other types of bears. ( )
- (3) Prevent cutting down bamboo and prevention of panda hunting, can save panda from extinction. ( )
- (4) Panda need food and can breathe oxygen gas in water to obtain energy. ( )

**Exercises on Lesson 1****1****1 Choose the correct answer :**

1. The sensory organs of a dolphin help it do all of the following, except .....
- a. surviving.
  - b. searching for food.
  - c. searching for water.
  - d. protecting itself under water.
2. To describe the delicious taste of a piece of chocolate, we should use the sense of .....
- a. sight.
  - b. smell.
  - c. taste.
  - d. touch.
3. To describe the color of your school bag to your friend, you should use the sense of .....
- a. sight.
  - b. smell.
  - c. taste.
  - d. touch.
4. Which of the following senses we use during watching a film on the T.V? .....
- a. Sight and taste.
  - b. Sight and smell.
  - c. Hearing and touch.
  - d. Sight and hearing.
5. The five senses of humans include .....
- a. sight, hearing, touch, smell, and movement.
  - b. sight, movement, taste, touch, and smell.
  - c. taste, touch, movement, hearing, and smell.
  - d. sight, hearing, taste, smell, and touch.
6. To know if a cup of water is hot or cold, we need to use the sense of .....
- a. sight.
  - b. hearing.
  - c. smell.
  - d. touch.
7. We can distinguish between water and milk through .....
- a. taste and hearing.
  - b. sight and hearing.
  - c. smell and hearing.
  - d. taste and sight.

8. If one of the beakers (A) and (B) contains sugar and the other contains salt, we can distinguish between them through the sense of .......
- smell.
  - taste.
  - touch.
  - hearing.



Beaker (A)



Beaker (B)

**2 Put (✓) or (✗) :**

- 1. A human can identify music through ears because it is the organ of sight. ( )
- 2. The Egyptian mongoose can communicate with its species by making sounds. ( )
- 3. The sense of hearing of dolphins is stronger than that of human. ( )
- 4. We use our sense of smell to identify the color of a flower. ( )
- 5. Skin helps human distinguish between the taste of different types of food through the sense of touch. ( )
- 6. A chameleon is one of the reptiles that use its tongue to taste food. ( )
- 7. The sense of smell is super in all animals. ( )

**3 Write the scientific term of each of the following :**

- 1. A property related to the bouncing back of sound to the dolphin when the sound waves hit objects under water. ( ..... )
- 2. The organ used to differentiate between different colors. ( ..... )
- 3. The organ used to differentiate between different types of food. ( ..... )
- 4. The organ used to differentiate between different scents. ( ..... )
- 5. The sense used to differentiate between smooth and rough surfaces. ( ..... )

**4 Complete the following sentences :**

- 1. The owl uses the senses of ..... and ..... in hunting preys at night, while the dog uses the senses of ..... and ..... in guarding.
- 2. A human can pay attention to an alarm bell in case of danger through the sense of .....
- 3. A human can recognize pictures in a gallery by ..... sensory organs.
- 4. Dolphins have sharp sense of ..... , which they use to locate living organisms under water through the ..... property.
- 5. We can identify the scent of flowers in spring using the organ of .....
- 6. A human can feel the hotness of a cup of coffee by using the sense of ..... while he can distinguish the taste of coffee by using the organ of .....

**5** Correct the underlined words :

- 1. The dog has sharp senses of smell and touch. (.....)
- 2. The weakest sense in dolphins is hearing. (.....)
- 3. Feeling cold when holding an ice cube depends on the sense of sight. (.....)
- 4. The fox uses its tail and ears to run away when it sees or hears its enemies. (.....)
- 5. The dog uses its eyes to identify its owner's scent. (.....)

**6** Give reasons for :

- 1. The Egyptian mongoose make sounds.
- .....  
.....  
.....

- 2. Owls can hunt during the night.
- .....  
.....  
.....

- 3. Dogs are used in guarding.
- .....  
.....  
.....

- 4. Dolphins can hear all kinds of sound.
- .....  
.....  
.....

**7** What happens when the sound waves produced by a dolphin hit an object under water ?**8** Arrange the following steps to illustrate how dolphins use their sharp hearing to catch preys :

- (.....) The sound waves travel and hit bodies, then bounce back to the dolphin in the form of an echo.
- (.....) The echo helps the dolphin locate its prey.
- (.....) The sound produced by a dolphin is transmitted in the form of waves called sound waves.

9 Complete the following table :

The Sense	The Sensory Organ
1. Sight	a. ....
2. ....	b. Skin
3. Hearing	c. ....
4. ....	d. Tongue
5. Smell	e. ....

10 Look at the following photos, then choose the correct answer :



Animal (1)



Animal (2)

1. The sharpest senses that animal (1) has are .....
  - a. touch and smell.
  - b. smell and hearing.
  - c. taste and sight.
  - d. hearing and taste.
2. Animal (1) uses one or both of these senses in each of the following situations except .....
  - a. identifying friends.
  - b. identifying food.
  - c. identifying strangers.
  - d. tasting food.
3. The sharpest sense that animal (2) has is .....
  - a. hearing.
  - b. taste.
  - c. touch.
  - d. smell.
4. Animal (2) uses its super sense in each of the following situations except .....
  - a. locating objects under water.
  - b. avoiding danger.
  - c. detecting scents of living organisms under water.
  - d. locating preys under water.

## Exercises on Lesson 2

**1 Choose the correct answer :**

- 1. In both human and owls, we find that the ability to see at night is .....
  - a. similar.
  - b. different.
  - c. greater in human than in owls.
  - d. better for human at night than during the day.
  
- 2. The senses upon which you depend to hold a small radio playing at low volume in a dark room are .....
  - a. hearing and smell.
  - b. touch and taste.
  - c. smell and taste.
  - d. hearing and touch.
  
- 3. The brain, as the control centre of the nervous system, can deal with ..... at the same time.
  - a. two senses only
  - b. three senses only
  - c. four senses only
  - d. all the five senses
  
- 4. Some animals go out at night in their habitats to .....
  - a. search for air.
  - b. search for a predator.
  - c. search for a prey.
  - d. sleep in the open air.
  
- 5. Animals that become active at night are called .....
  - a. diurnal animals.
  - b. nocturnal animals.
  - c. extinct animals.
  - d. endangered animals.
  
- 6. Some animals become active during the night due to the following reasons except that .....
  - a. the night is characterized by the cool weather.
  - b. the night is a good time for relaxation and rest.
  - c. the night is quiet, so that they can hear preys.
  - d. the night is a time when preys are available.
  
- 7. A snake has the ability to catch preys at night because .....
  - a. it can smell them.
  - b. it can hear their heartbeats.
  - c. it can see them clearly at night.
  - d. it can sense the heat of their warm bodies.
  
- 8. Both bats and mosquitoes become active during night. Which of the following statements is correct ? .....
  - a. Both can swim well.
  - b. Both can run fast.
  - c. Bats prey on mosquitoes.
  - d. Mosquitoes prey on bats.

- 9. If a rat was found at equal distances from an owl and a snake, and it made a quiet move at night, which of the following statements is correct ? .....
  - a. The owl might reach it first, if it sensed the rat's body heat.
  - b. The snake might reach it first, if it heard the rat movement.
  - c. Both of them might reach the rat at the same time because both have sharp eyesight.
  - d. The owl might reach it first, because owls have sharp eyesight and hearing.
- 10. A snake can sense warm bodies of preys at night using .....
  - a. all of its body.
  - b. a special part of its tail.
  - c. a special part of its face.
  - d. a special part of its back.
- 11. Bats rely on ..... to locate their preys in the dark.
  - a. echolocation only
  - b. their sharp hearing only
  - c. their sharp eyesight and taste
  - d. echolocation and their sharp hearing
- 12. Flying bats don't hit different objects at night because they can .....
  - a. see them.
  - b. touch them.
  - c. smell them.
  - d. hear the echo reflected from them.
- 13. Owls have all the following properties that give them greater ability to sense distant preys making low sounds, except .....
  - a. large eyes.
  - b. a bowl-shaped face.
  - c. a head that turns in all directions.
  - d. weak sense of hearing.
- 14. The owl's large eyes and bowl-shaped face considered as ..... adaptation.
  - a. only structural
  - b. only behavioural
  - c. both structural and behavioral
  - d. neither structural nor behavioral
- 15. The nervous system of mammals consists of .....
  - a. the brain only.
  - b. the spinal cord only.
  - c. nerves and the spinal cord only.
  - d. the brain, the spinal cord and nerves.
- 16. The electrical impulses that transmit information from the surrounding environment through nerves are .....
  - a. in one direction only to the brain.
  - b. in one direction only from the brain.
  - c. in two opposite directions first from the brain and then back to it.
  - d. in two opposite directions first to the brain and then from it.

- 17. Both the spinal cord and nerves .....
  - a. are located in the backbone.
  - b. are located in the small intestine.
  - c. transmit messages from the brain to all parts of the body only.
  - d. transmit messages from the brain to all parts of the body and vice versa.
- 18. All of the following are sensory organs except the .....
  - a. eyes.
  - b. nose.
  - c. skin.
  - d. lungs.
- 19. The nerves transmit information from and to the brain in the form of .....
  - a. magnetic impulses.
  - b. electrical impulses.
  - c. light impulses.
  - d. sound impulses.
- 20. Which of the following choices explain how the body reacts to the smell of food in the correct order ? .....
  - a. The brain → the nose → the nerves.
  - b. The nose → the brain → the nerves.
  - c. The nerves → the brain → the nose.
  - d. The nose → the nerves → the brain.
- 21. The organ that processes the information collected through the sense of sight is .....
  - a. the spinal cord.
  - b. the nerves.
  - c. the brain.
  - d. the eyes.
- 22. The correct order for a bat to locate a mosquito, is .....
  - a. the mosquito makes a sound → that reaches the bat → and then returns to the mosquito.
  - b. the bat makes a sound → that reaches a wall → and then returns to the mosquito.
  - c. sound of birds → reaches the mosquito → and then returns to the bat.
  - d. the bat makes a sound → that reaches the mosquito → and then returns to the bat.
- 23. If you wake up to the smell of grilled chicken, the first part of your body that receive this smell is .....
  - a. the sensory receptors in the ears.
  - b. the sensory receptors in the mouth.
  - c. the sensory receptors in the skin.
  - d. the sensory receptors in the nose.

**2** Choose from column (B) what suits it in column (A) :

- (1)

(A)	(B)
1. Bat	a. It is from the flying nocturnal animals that can hear the quiet movements of rats.
2. Owl	b. It is from the nocturnal reptiles that can sense the body heat of rats.
3. Snake	c. It is a non-flying mammal. d. It is one of the flying nocturnal animals that sound reflected to it after hitting mosquitoes.

1. .... 2. .... 3. ....

- (2)

(A)	(B)
1. Sensory receptors	a. It is the main control centre in an animal body.
2. Nerves	b. They are electrical impulses that reach the brain.
3. Brain	c. It is found in the backbone and transmit messages from and to the brain.
4. Spinal cord	d. They are found on the sensory organs, and the first to sense the surrounding environment. e. They receive information from the sensory receptors.

1. .... 2. .... 3. .... 4. ....

**3** Put (✓) or (✗) :

- 1. The sensory receptors in the eyes receive the sound produced by a radio and send it to the brain. ( )
- 2. Animals that are active during the daytime are called the nocturnal animals. ( )
- 3. Some animals prefer hunting during the night than hunting during the day. ( )
- 4. Some animals have abilities that humans do not have, and these abilities are called super sensory adaptations. ( )
- 5. The owl depends on the echo to determine the location of preys within the grass or beneath the snow. ( )
- 6. A bat makes sounds that hit insects and then bounce back to it, thus the bat can locate them. ( )
- 7. A snake has the ability to sense the cold bodies of preys using a special part of its face. ( )

- 8. The spinal cord is the main control center of the body, which carries messages from and to the brain. ( )
- 9. The heart and eyes are connected to the brain through blood vessels that transmit information in the form of electrical impulses. ( )
- 10. The tongue is the sensory organ responsible for taste, which sends messages to the brain to be processed and therefore, identifying the food type. ( )
- 11. The sensory receptors in the nose are responsible for touching. ( )

**4** Write the scientific term of each of the following :

- 1. A group of different animals that look for their prey at night. (.....)
- 2. A reptile that can sense the body heat of its prey at night using a special part of its face. (.....)
- 3. A property by which a bat can locate its prey insects through the sound reflected from them. (.....)
- 4. An animal that can turn its head backwards, and has a bowl-shaped face and large eyes. (.....)
- 5. A system that controls all the body functions, and nerves are one of its parts. (.....)
- 6. The organ responsible for processing information transmitted to it, and then send messages to the sensory organs. (.....)
- 7. An organ composed of a group of nerves located in the backbone, and sends messages from and to the brain. (.....)
- 8. They include the eyes, nose, ears, tongue and skin, and they receive information from the surroundings and send it to the brain. (.....)
- 9. A type of nerves in the sensory organs that is responsible for receiving information from the environment. (.....)

**5** Complete the following sentences :

- 1. To determine places of prey at night, snakes rely on their abilities to sense ..... produced by the prey bodies whereas, bats locate their prey using ..... property.
- 2. Echolocation property is used by ..... and ..... animals to locate their prey.
- 3. Bats use the echo to find their food, this is considered as an example of ..... adaptation.
- 4. Owls can detect the places of their prey by using the super senses of ..... and .....
- 5. An owl can see everywhere by turning ..... in all directions, whereas a chameleon can see everywhere by moving its ..... in opposite directions.
- 6. A brain is connected to a group of nerves that passes through the backbone that is known as the .....
- 7. Information is transmitted from the sensory organs to the brain in the form of ..... through .....
- 8. If you saw a cat, you have received this information through the sensory receptors in your ....., and then the nerves send a signal to your .....

**6** Correct the underlined words :

- 1. Some animals hunt at night because the number of preys is few and the weather is cool. (      )
- 2. Tongue is the sensory organ that is responsible for smelling sour lemon. (      )
- 3. The spinal cord passes through the mouth. (      )
- 4. When a bat sends a sound against a wall, it returns to it. This phenomenon is called camouflage. (      )
- 5. The sensory receptors are the last part that receive information from the surrounding environment. (      )
- 6. The way through which a snake senses its prey is similar to the way that an owl senses its prey. (      )
- 7. The organ that is responsible for receiving, processing and responding to information is the heart. (      )
- 8. The sense of eyesight of owls is weaker than that in bats. (      )

**7** Give reasons for :

- 1. Animals that live in hot regions become active at night.  
.....  
.....
- 2. Snakes have a part in their faces that have a super ability to sense heat.  
.....  
.....
- 3. Owls have bowl-shaped faces.  
.....  
.....
- 4. All the sensory organs are connected to the brain through nerves.  
.....  
.....
- 5. Snakes can find food at night, although they cannot see well in the dark.  
.....  
.....
- 6. Although animals hiding within grass or beneath snow and make quiet movements, owls can find them.  
.....  
.....

**8** What happens if ... ?

- 1. A snake is injured in its face in the part that sense the heat.

2. Bats lose the ability to hear by using echolocation property.

3. Owls cannot turn their heads in all directions.

4. The sensory receptors in an owl's ears are weak.

**9** Read the following paragraphs, then correct the underlined words :

- The bowl-shaped faces of owls and the fur on their heads are considered a behavioural adaptation that helps them detect and amplify distant sounds. In addition, the ability of owls to turn their eyes in all directions is also a behavioural adaptation that helps them search for preys.

**10** Look at the opposite figure, then answer the questions below :

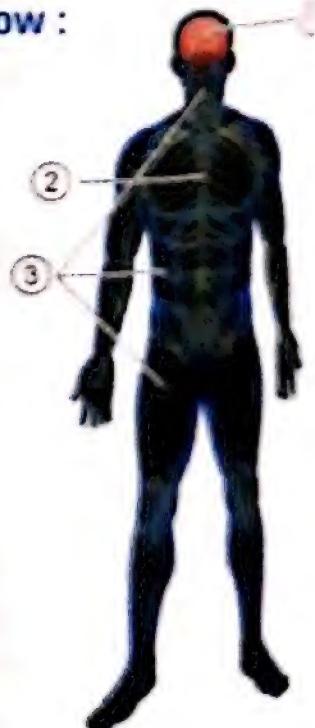
- What does the figure represent ?

- Label the figure :

①

②

③



- Complete :

- Number ( ) is found inside the backbone of the human body.

- Number ( ) represents the main control centre in the human body.

- Number ( ) spreads all around the human body parts.

## Exercises on Lesson 3

**1 Choose the correct answer :**

- 1. When a jerboa hears the sound of a moving snake, it .....
  - a. remains standing in its place.
  - b. jumps to hunt the snake.
  - c. makes sounds to frighten the snake.
  - d. jumps quickly to run away from the snake.
  
- 2. The system responsible for moving your hand away from danger, such as touching a hot cup of tea, is the ..... system.
  - a. digestive      b. respiratory      c. nervous      d. urinary
  
- 3. When snakes make a noise, the sensory receptors found in jerboa's ..... send a warning message to the brain.
  - a. ears      b. nose      c. feet      d. teeth
  
- 4. When your hand touches the spines of a cactus plant, it is withdrawn in .....
  - a. less than one second.      b. one minute.
  - c. two minutes.      d. one hour.
  
- 5. During crossing a street, you had to stop for a moment to avoid the danger of being hit by a car. The system that alerted you was the ..... system.
  - a. respiratory      b. digestive      c. urinary      d. nervous

**2 Put (✓) or (✗) :**

- 1. The body senses and systems work separately when animals run away from their enemies. ( )
  
- 2. The Egyptian jerboa lives in forests. ( )
  
- 3. A jerboa has large ears which help in sensing the snakes. ( )
  
- 4. The Egyptian jerboa can jump for long distances depending on its long hind legs. ( )
  
- 5. Hopping of the jerboa in zigzag patterns to run away from danger is considered as a structural adaptation. ( )
  
- 6. The large ears of a jerboa is an example of structural adaptation. ( )
  
- 7. The habitat of the jerboa is similar to that of the polar bear. ( )

**3 Write the scientific term of each of the following :**

- 1. A species of desert rodents with a small body, large ears and long hind legs. (.....)
  
- 2. The shape of the paths taken by a jerboa while running away from danger. (.....)

- 3. The time taken by an organism's body to respond to different reactions around it. (.....)
- 4. A system that works inside the human body such that it keeps the organism away from danger. (.....)
- 5. The organ which receives and processes the messages sent from the sensory receptors that are found in a jerboa's ears. (.....)

#### 4 Complete the following sentences :

- 1. The system which is responsible for moving your hand away when you touch a cup of hot water is the ..... system.
- 2. Hopping of the Egyptian jerboa in zigzag patterns to stay away from the snakes attacking it, is considered as a ..... adaptation.
- 3. The presence of hair on a jerboa's feet and toes to help it catch sand when it jumps, is a ..... adaptation.
- 4. The Egyptian jerboa as well as the fennec fox have an excellent sense of ..... where both of them have large .....
- 5. The Egyptian jerboa has long ..... to help it jump for a long distances, and it has hair on its feet and toes to help it .....
- 6. On hearing an alarm ring, the sensory receptors that are found in the ..... send a message through a network of nerves to the ..... which determines what to do to avoid danger.
- 7. When the Egyptian jerboa is in danger, it starts to run away, this action occurs in a very short time called the .....

#### 5 Correct the underlined words :

1. The hand moves away slowly when it touches the spines of a cactus plant.
2. The Egyptian jerboa is a small sized desert reptile.
3. A jerboa's feet and toes are covered with feathers.
4. The small ears of a jerboa help in sensing snakes.
5. The digestive system delivers messages through a network of nerves around all body parts.
6. Hearing is one of the weak senses of the jerboa.

#### 6 Give reasons for :

- 1. You move your hand away quickly when touching a cup of hot coffee.

- 2. The Egyptian jerboa can jump for a long distances.
- 3. The presence of hair on the Egyptian jerboa's feet and toes.
- 4. The Egyptian jerboa's ears play a very important role in its survival.

**7** What happens if ... ?

- 1. Your hand touches the spines of barbary fig plant.
- 2. The Egyptian jerboa hears a snake moves towards it.
- 3. You smell something burn near you.

**8** If you knew that the color of the desert jerboa is the same color of sand.

- a. Is the color of the jerboa a structural or behavioral adaptation?
- b. In your opinion, how does this adaptation help the jerboa survive?

**9** Arrange the following sentences according to how body parts of the Egyptian jerboa act to avoid danger:

- ( ) The brain alerts the jerboa's legs to start moving
- ( ) The brain processes the message telling there is a danger
- ( ) A jerboa hears a snake moves towards it
- ( ) The jerboa jumps in zigzag paths to run away from the snake.
- ( ) The sensory receptors found in jerboa's ears send a message to the brain.

- 10 Complete the following table with the sense and the organ that is responsible for sending a message to the brain in the following situations:

Situation	Sense	Responsible organ
1. You like the scent of your classmate's perfume :		
2. Walking over a very hot sand on the beach :		
3. Eating food with a high salt content :		
4. Listening to music on a radio :		
5. Watching the stars in the sky at night :		

## Exercises on Lesson 4

## 1 Choose the correct answer :

- 8. When you hear a fire alarm and smell a smoke odour, all of the following play a role such that a person can survive and run away from this place except
  - a. sensory receptors in the nose and eyes.
  - b. nerves, spinal cord and brain.
  - c. digestive system.
  - d. different body muscles.

**2** Choose from column (A) what suits it in column (B) :

(A)	(B)
1. Reaction time :	a. responsible for moving a person to another place far away from danger, by the help of the nervous system.
2. Response :	b. responsible for getting energy from food and oxygen to run away from danger.
3. Nervous system :	c. is the period from sensing danger to being away from it.
4. Body muscles :	d. contains the main control centre of the body. e. resulted from the integration of the nervous system and different body muscles.

1. ....

2. ....

3. ....

4. ....

**3** Put (✓) or (✗) :

- 1. The body can respond to more than one external stimulus at the same time. ( )
- 2. Two people may respond differently to bright light by closing their eyes, because the reaction time varies depending on their sight strength. ( )
- 3. The brain responds to the auditory stimulus faster than the visual stimulus. ( )
- 4. The response to a danger begins with sensory receptors. ( )
- 5. Reaction time should be as long as possible so an animal can think how to run away from a danger. ( )
- 6. Different body muscles play an important role in completing the response to danger and running away from it. ( )
- 7. If the nervous system works well, but the animal does not have enough energy to escape, it can be hunted by the predator. ( )
- 8. Visual reaction time varies from one species to another. ( )

**4** Correct the underlined words :

- 1. When you hear the fire sirens, your eyes send a signal to the brain. (.....)
- 2. In response to a danger, blood vessels play a critical role in transmitting nerve signals to and from the brain. (.....)
- 3. The response to a danger begins with the brain and ends with the suitable response. (.....)
- 4. The longer the reaction time to a danger, the greater the chance of survival. (.....)

**5** Complete the following sentences :

- 1. When you see a pencil falling, the speed at which you hold it is ..... than when you just hear it falling.
- 2. ..... is considered the linkage between the eye, brain, and hand when sending information to hold a stick as it falls.
- 3. If you hurt your hand while cutting vegetables, the nerves in the ..... send a signal to the ....., therefore, you can feel the pain.
- 4. When you taste a sour juice, the nerves in the ..... send a signal to the brain, whereas, when you smell a bad odour the nerves in the ..... send a signal to the brain.
- 5. The response of the eye nerves is ..... than that of the ear nerves.

**6** Give reasons for :

- 1. Stopping suddenly when you hear a car coming up behind you.
- .....  
.....

- 2. Running to save a young child falling from his seat.
- .....  
.....

- 3. Runners start to sprint at the sound of a referee whistle.
- .....  
.....

**7** Ahmed has an injury in the nerves between the brain and his ears.

- Put (✓) in front of the situations in which Ahmed's response may be affected by his injury :

- 1. A beep sound of a car coming quickly behind him. ( )
- 2. Smelling fires. ( )
- 3. Touching the spines of prickly pear plant. ( )
- 4. Dirt entering his eyes. ( )
- 5. Ringing fire alarm at home. ( )

**8** Reaction time is important for all living organisms to avoid any danger or harm. What do you think might happen in the following cases if the reaction time takes a longer unsuitable time?

- 1. A snake sensing the body heat of its prey.

- 2. A jerboa hearing a snake nearby.

- 3. Seeing a glass cup falling.

- 4. A bat sensing the sound waves bouncing off (returning back from) a wall in front of it.

**9** Arrange the following sentences which explain how the brain processes information :

(.....) The brain processes information.

(.....) The nerves of the ears send a signal to the brain.

(.....) The brain sends a signal to the muscles to move to start the race.

(.....) Hearing the whistle sound to start the race.

**10** Ramy stopped suddenly, while walking down the street because he heard the horn of a car coming fast towards him from behind. Moreover, Maha also suddenly stopped, while crossing the street because she saw the same car coming fast towards her.

Which one has a faster reaction time? And why?

## Exercises on Lesson 5

**1 Choose the correct answer :**

- 1. The nervous system can do all the following functions except .....
  - a. gathering information.
  - b. processing information.
  - c. sending signals.
  - d. falling of rains.
  
- 2. If you smell smoke from something burning nearby, then you realized you had to move away fast. This means that there is an integration between the ..... in this situation.
  - a. digestive system and respiratory system
  - b. digestive system and nervous system
  - c. respiratory system and nervous system
  - d. nervous system and urinary system
  
- 3. Your sensation of thunder and lightning depends on your senses of .....
  - a. sight and hearing.
  - b. sight and smell.
  - c. hearing and touch.
  - d. hearing and taste.
  
- 4. You opened the door of your house when you heard the doorbell. Which of the following statements explains the sequence of messages inside your body in this situation?
  - a. Ears → brain → feet → hand.
  - b. Ears → brain → hand → feet.
  - c. Ears → hand → brain → feet.
  - d. Ears → feet → hand → brain.
  
- 5. You pass the football to a player in your team. Which of the following statements explains the sequence of messages inside your body in this situation?
  - a. Feet → nerves → brain.
  - b. Nerves → brain → feet.
  - c. Nerves → feet → brain.
  - d. Brain → nerves → feet.
  
- 6. The ..... plays a great role in the functioning of the nervous system.
  - a. small intestine
  - b. trachea
  - c. brain
  - d. oesophagus
  
- 7. Your sensation of hot weather depends on sensory receptors in the .....
  - a. eyes.
  - b. nose.
  - c. ears.
  - d. skin.
  
- 8. Closing your eyes quickly when light rays fall on them represents a .....
  - a. inhalation.
  - b. reflex action.
  - c. countershading.
  - d. camouflage.

## 2 Put (✓) or (✗) :

- 1. The brain sends automatic signals so that we can breathe.
- 2. The bones carry information from sensory organs to the brain in the form of electrical pulses.
- 3. The spinal cord delivers messages between the brain and the feet.
- 4. Sensory receptors in your fingers can distinguish between smooth and rough objects.
- 5. Parts of the nervous system work together to gather and process information, and send signals.
- 6. If your teacher asked you to take the pen out of your bag and use it to write, and you did. That means the message your ears received reached your hand directly.
- 7. Sensory organs are responsible for processing information.

## 3 Write the scientific term of each of the following :

- 1. An organ in the human body that can distinguish between the smell of vinegar and perfume. (.....)
- 2. It delivers messages between the spinal cord and different body organs. (.....)
- 3. A sense by which you can recognize the sour taste of lemon. (.....)
- 4. A type of waves that can be transferred from your ears to your brain. (.....)

## 4 Complete the following sentences :

- 1. When you look at a picture, your ..... system collects information about what it saw and understand it to realize that you saw a picture of a dog.
- 2. The ..... is the organ that sends information to the brain when you smell the scent of a nice perfume.
- 3. If you come near your dog, its nose sends a message through the nerves to the ..... alerting it that you are coming.
- 4. When you touch a very hot object, your hand moves away quickly. This is called ..... .
- 5. The ..... can sense the heat its prey's body at night, because the skin of its head sends a message with the prey location to the brain through a network of ..... .

- 6. When you hear a train horn, ..... in the ears send a message through a network of nerves to reach the .....
- 7. The ..... is the organ that is responsible for recognizing surrounding sounds, while the ..... is the organ that is responsible for identifying different odours.
- 8. When an owl hears the sound of its prey, sensory receptors in the ..... gather information about that sound, and then send this information through the ..... to the ..... to be processed.

**5** Correct the underlined words :

- 1. The sensory receptors in your nose can recognize the sound of birds. (.....)
- 2. The muscles in the sensory organs within your body are responsible for receiving information from the surrounding environment. (.....)
- 3. If you find something that was missing, it means that your eyes sent a message to your brain through a network of blood vessels. (.....)
- 4. When your eyes are closed, you can distinguish between your brother's voice and your friend's voice, depending on your sense of sight. (.....)
- 5. The spinal cord is responsible for processing sound waves coming through ears. (.....)

**6** Cross out the odd words :

- 1. Smell – Taste – Eyes – Eearing. (.....)
- 2. Eyes – Nose – Skin – Taste. (.....)
- 3. Spinal cord – Lungs – Nerves – Brain. (.....)

**7** Give reasons for :

- 1. Humans can recognize the sounds of different musical instruments.
- .....  
.....

- 2. The spinal cord plays an important role in the functioning of the nervous system.
- .....  
.....

- 3. The brain plays an important role in the function of the nervous system.
- .....  
.....

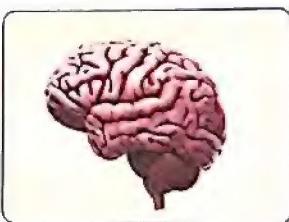
**8** What happens if ... ?

- 1. The spinal cord became absent from the components of the nervous system.
- .....  
.....

2. You saw a bright car light coming towards you as you crossed the street.

3. Sensory receptors related to the eyes stopped sending messages to the brain.

**9** Look at the following figures, then complete the following sentences:



Part (1)



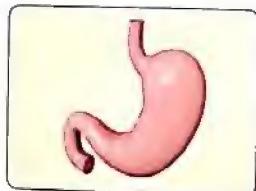
Part (2)



Part (3)

1. These body parts belong to the ..... system.
2. When you touch a freezing bottle of water, part number ..... in your hand sends a message through part number ..... to reach part number ..... telling you that this bottle is very cold.

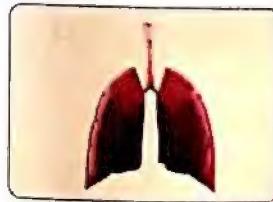
**10** You have some pictures of different parts of the human body. Write down the organ number in front of the system to which it belongs in the following table.



(1)



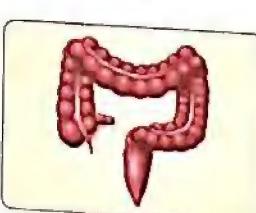
(2)



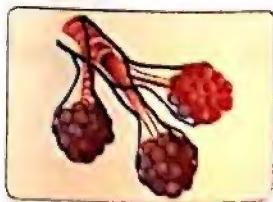
(3)



(4)



(5)



(6)

System name	Organ number
1. Digestive system :	.....
2. Respiratory system :	.....
3. Nervous system :	.....

# Exercises

## on Lessons of Concept (1.3)

Understand

Apply

Analyze

Evaluate

Create

### Exercises on Lesson 1

#### 1 Choose the correct answer :

- 1. Which of the following organs are working together for seeing different objects ? .....
  - a. Nose and brain.
  - b. Eyes and brain.
  - c. Ears and brain.
  - d. Tongue and brain.
- 2. All the following things are considered as a light source, except .....
  - a. the Sun.
  - b. fire.
  - c. eyes.
  - d. the light lamp.
- 3. ..... energy affects the sensory receptors in eyes of living organisms causing vision.
  - a. Electric
  - b. Sound
  - c. Heat
  - d. Light
- 4. To know what you are seeing and recognize it, the ..... must receive sensory impulses from eyes.
  - a. spinal cord
  - b. brain
  - c. sensory receptors in eyes
  - d. sensory receptors in ears
- 5. If you see someone walking around in a dark place without hitting anything around him, so this person may .....
  - a. have a lot of food energy.
  - b. have a big ability to breathe.
  - c. have the same hearing ability of bat.
  - d. wear a night vision goggles.
- 6. Animals that have a strong vision to hunt at night, include .....
  - a. owl and snake.
  - b. owl and bat.
  - c. owl and cat.
  - d. cat and snake.
- 7. The structural adaptation that helps the fishing cat to catch a prey at night, is that its ability .....
  - a. to feel the heat of prey's body.
  - b. to hide inside the forest.
  - c. to digest its prey easily.
  - d. of excellent night vision.
- 8. The thing that makes the eyes of fishing cats glow at night, is .....
  - a. the light that bounces off the surroundings.
  - b. the light that bounces off the membrane on the back of their eyes.
  - c. the main controlling centre of its body.
  - d. the behavioral adaptation with the surroundings.

9. The Sun and the Moon appear bright, because .....

- the light is bounced off both of them.
- the light is emitted from both of them.
- the light is bounced off the Sun and is emitted from the Moon.
- the light is bounced off the Moon and is emitted from the Sun.

**2** Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Fishing cat	a. has poor night vision, so it depends on feeling the heat of prey's body.
2. Owl	b. lives in water and depends on the sound that bounces off prey's body.
3. Bat	c. has poor night vision, so it depends on the sound that bounces off prey's body.
4. Snake	d. has excellent night vision and its eyes glow at night. e. has extraordinary sight at night and bowl-shaped face.

1. ....

2. ....

3. ....

4. ....

**3** Put (✓) or (✗) :

- 1. Humans and animals can see the surroundings, due to the presence of light sensory receptors in their eyes and in the absence of the main controlling centre of the body. ( )
- 2. Eyes are considered as sensory organs of light, not as a source of light. ( )
- 3. Eyes are one of the five senses, on which humans and animals depend on to see the surroundings. ( )
- 4. Cats have excellent night vision, while snakes and bats are not. ( )
- 5. The special membrane on the back of cat's eyes is similar to the Moon, in that both of them bounces off the falling light. ( )
- 6. The membrane that presents on the back of a fishing cat's eye does not present in other cat species. ( )
- 7. The Moon is not considered as a light source. ( )
- 8. The light that enters the human eyes allow him to distinguish between weak and strong sounds. ( )
- 9. At night, cats eyes look like small lighted lamps. ( )

**4 Write the scientific term of each of the following :**

- 1. The organ that is affected by light and responsible for sight. (.....)
- 2. A species of wild cats, that have eyes glow at nights. (.....)
- 3. Objects, that emit their own light. (.....)
- 4. The organ that is responsible for processing information received from eyes, to know and recognize the surroundings. (.....)
- 5. A body that appears lighted in the sky at night, but it is not considered as a source of light. (.....)
- 6. A tool that the human can depend on to see at dark. (.....)

**5 Correct the underlined words :**

- 1. Humans and cats are similar in their seeing ability at nights. (.....)
- 2. The energy that help humans and animals to see, is the sound energy. (.....)
- 3. The Moon is one of the light sources in the sky. (.....)
- 4. The system that works with the eyes of living organisms for seeing objects, is the digestive system. (.....)
- 5. Cats eyes glow at night, due to the presence of a mirror-like membrane on the front of their eyes. (.....)

**6 Complete the following sentences :**

- 1. The ..... is considered the organ of sight in humans and animals, while ..... is the main control center in their bodies.
- 2. The eyes of ..... seem to glow in the dark, while the eyes of ..... can see in two opposite directions at the same time.
- 3. The fishing cat can hunt at night depending on the sense of ..... , while snake can hunt at night depending on its ability to sense ..... which comes out from its prey's body.
- 4. The fishing cat can hunt at night due to the bouncing off ..... energy, while bat can hunt at night due to the bouncing off ..... waves.
- 5. The eyes of fishing cat have a mirror-like membrane bounces off the light, and this is considered as a ..... adaptation.
- 6. Human can see objects which ..... their own light or objects which ..... light.
- 7. Among the objects which give out their own light are ..... and ..... while ..... and ..... are objects that bounce off light.
- 8. Some senses in animals are stronger than those in human such as sense of ..... in tarsier and sense of ..... in fennec fox.
- 9. The structure of fishing cat's eyes is considered as a ..... adaptation, while its activation at night to hunt is considered as a ..... adaptation.

**7** Give reasons for :

- 1. Human can't see in the dark.
- .....  
.....  
.....

- 2. The fishing cat's eyes seem to glow in the dark.
- .....  
.....  
.....

- 3. Candles are considered as a source of light.
- .....  
.....  
.....

- 4. We can see the Moon shining at night although it is not a source of light.
- .....  
.....  
.....

**8** What happens if ... ?

- 1. The mirror-like membrane in the fishing cat's eyes is damaged.
- .....  
.....  
.....

- 2. The Moon can't reflect light.
- .....  
.....  
.....

- 3. The sensory receptors of fishing cat's eyes are damaged.
- .....  
.....  
.....

**9** Cross out the odd word :

- 1. Owl – Fishing cat – Bat.
- 2. Bat – Fishing cat – Dolphin.
- 3. The Sun – The Moon – Fire.
- 4. The Moon – Mirror – Candle.

(.....)

(.....)

(.....)

(.....)

**10** Write the sense or senses which is/are stronger than those in human in each of the following animals :

- 1. Fishing cat : .....

- 2. Owl : .....

- 3. Dolphin : .....

**11** Look at the opposite photos, then answer the questions below :

1. Which of them can hunt at night depending on its sense of sight ?

.....



Fishing cat

2. In your opinion, which of them has faster reaction time ? Why ?

.....



Bat

**12** Give one example for each of the following :

- 1. An animal has the ability to see at night and its eyes seem to glow in the dark.

.....

- 2. An animal that can fly and has a strong sense of hearing, so it can depend on echolocation property.

.....

- 3. An animal has the ability to sense heat to hunt its prey.

.....

- 4. One of the sources of light which gives out its own light.

.....

**Exercises on Lesson**

2

**1 Choose the correct answer :**

- 1. Humans have ..... eyes than nocturnal animals.
  - a. bigger
  - b. smaller
  - c. stronger
  - d. sharper
- 2. The pupils of human eyes open ..... that of nocturnal animals.
  - a. typical to
  - b. narrower than
  - c. wider than
  - d. similar to
- 3. The wide pupils of human eyes, letting in ..... light than those of fishing cat.
  - a. very large amount of
  - b. large amount of
  - c. more
  - d. less
- 4. Nocturnal animals depend on all the following senses to find out their preys at night, except .....
  - a. sight sense.
  - b. hearing sense.
  - c. taste sense.
  - d. smelling sense.
- 5. All of the following are preys for tarsier, except .....
  - a. insects.
  - b. penguins.
  - c. small lizards.
  - d. small birds.
- 6. Both tarsier and owl, .....
  - a. can swim.
  - b. can fly.
  - c. are nocturnal animals.
  - d. belong to the same species.
- 7. Owls and ..... cannot move their eyes in their sockets.
  - a. fishing cats
  - b. arctic foxes
  - c. humans
  - d. tarsiers
- 8. Each of human, fishing cat and tarsier, .....
  - a. has an excellent night vision.
  - b. becomes more active at night.
  - c. has a mirror-like membrane in its eyes.
  - d. has two eyes adapted for vision.
- 9. Which of the following do not need a big amount of light to see in the dark ?
  - a. Humans and cats.
  - b. Humans and tarsiers.
  - c. Cats and tarsiers.
  - d. Bats and humans.
- 10. To detect the place of a table in a completely dark room, you can depend on
  - a. sight sense.
  - b. touch sense.
  - c. taste sense.
  - d. hearing sense.

**2** Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Tarsier	a. has a mirror-like membrane on the back of its eyes.
2. Human	b. depends on the echolocation property to find a prey.
3. Cat	c. doesn't have spectacular night vision, but depends on night vision goggles.
4. Owl	d. its eyes cannot move in their sockets, and it has a bowl-shaped face.
	e. its eyes cannot move in their sockets, and it is a tiny monkey.

1. .... 2. .... 3. .... 4. ....

**3** Put (✓) or (✗) :

- 1. Nocturnal animals include fishing cats, owls, and tarsiers. ( )
- 2. Tarsier eats insects, small lizards and small birds. ( )
- 3. Tarsiers, fishing cats, humans and owls have an excellent night vision. ( - )
- 4. Panther chameleon eyes can move independently of each other, while tarsier and owl eyes cannot move in their sockets. ( )
- 5. Both of tarsier and fishing cat can turn their heads 180 degrees. ( )
- 6. Although snake has a weak night vision, but it can hunt at night. ( )
- 7. Most of nocturnal animals have huge eyes to gather and reflect any little light available. ( )
- 8. You can see the shadow of an object in a complete dark room, but you cannot see the object itself. ( )

**4** Write the scientific term of each of the following :

- 1. Animals that have spectacular night vision, on which they are depend on to hunt. (.....)
- 2. It is an opening through which the light can enter the eyes of humans and animals. (.....)
- 3. A tiny monkey, its length is about 10 centimeters long. (.....)

**5** Correct the underlined words :

- 1. Nocturnal animals have weak night vision, and also depend on excellent hearing and smelling senses to hunt. (.....)

2. Nocturnal animals have smaller eyes than humans. (.....)
3. Toad is a tiny monkey, that has big eyes and hunt at night. (.....)
4. Tarsier is similar to human, where both of them cannot move their eyes in their sockets. (.....)

### 6 Complete the following sentences :

- 1. Eyes of human are ..... than eyes of nocturnal animals and pupils of nocturnal animals open ..... than in human.
- 2. In complete darkness nocturnal animals depend on other senses such as ..... , ..... and .....
- 3. Tarsier and owl have huge ..... , while ..... has a mirror-like membrane in its eyes to reflect light.
- 4. Tarsier eyes are similar to that of ..... as both of them can't move their eyes in their .....
- 5. To see things clearly we need a source of ..... but ..... animals can hunt at night depending on other senses.
- 6. In the weakest light levels, dolphin can hunt depending on its sense of ..... , while tarsier depend on its sense of .....
- 7. Huge eyes in ..... and ..... help them to gather and reflect light, while extra-large ears in ..... fox help it to hunt.
- 8. The property of moving the head 180 degrees is found in ..... and ..... animals, while eyes which can see in two opposite directions at the same time is found in ..... animal.

### 7 Give reasons for :

- 1. Nocturnal animals can see better than human at night.  
.....  
.....
- 2. Although tarsier and owl can't move their eyes, they can see surrounding objects in all directions.  
.....
- 3. Tarsier and owl have huge eyes.  
.....

**8 What happens if ... ?**

- 1. Nocturnal animals are found in complete darkness places.
- .....  
.....

- 2. Tarsier and owl have heads with small range of movement like human.
- .....

- 3. Human has a head like owl moves in 180 degrees.
- .....

**9 If there is a small green lizard in a place with weak light levels.**

- Answer the following questions :

- 1. Which of the following animals can see and hunt it ? .....

- |             |             |
|-------------|-------------|
| a. Bat.     | b. Snake.   |
| c. Tarsier. | d. Dolphin. |

- 2. Which of the following living organisms can hear its quiet movements and hunt it ? .....

- |             |           |
|-------------|-----------|
| a. Snake.   | b. Owl.   |
| c. Dolphin. | d. Human. |

- 3. If this green lizard stands between some green leaves and don't move completely. Which of the following living organisms can hunt it easily ? .....

- |             |           |
|-------------|-----------|
| a. Owl.     | b. Human. |
| c. Tarsier. | d. Snake. |

**Exercises on Lesson****3****1 Choose the correct answer :**

- 1. The energy which must present to make our eyes able to see the objects around us, is ..... energy.
  - a. sound
  - b. electric
  - c. light
  - d. magnetic
- 2. Fishing cat can see at night, as follows .....
  - a. light falls on the eyes, then reflected to the objects.
  - b. light falls on the objects, then reflected into the eyes.
  - c. sound falls on the eyes, then reflected to the objects.
  - d. sound falls on the objects, then reflected into the eyes.
- 3. Both light energy and sound energy, .....
  - a. can be seen.
  - b. cannot be seen.
  - c. the light energy can be seen, while sound energy cannot be seen.
  - d. the sound energy can be seen, while light energy cannot be seen.
- 4. Our eyes send ..... messages to the brain, where the information is processed.
  - a. written
  - b. electrical impulses
  - c. hearing
  - d. light impulses
- 5. All the following living organisms have tapetum lucidum, except .....
  - a. snakes.
  - b. fishing cats.
  - c. dogs.
  - d. horses.
- 6. The function of tapetum lucidum, looks like the function of .....
  - a. night vision goggles.
  - b. white paper.
  - c. black paper.
  - d. radio.
- 7. In the nocturnal animals, the tapetum lucidum is a life-saving adaptation because it helps them to ..... at night.
  - a. sleep
  - b. breathe
  - c. keep their body warm
  - d. hunt a prey and avoid to be a prey

**2 Choose from column (B) what suits it in column (A) :**

(A)	(B)
1. Brain	a. through which sensory receptors of the eyes send messages to the brain.
2. Pupil	b. through which the light waves enter the eyes.
3. Tapetum lucidum	c. through which the snake can feel the heat of its prey's body.
4. Nerves	d. through which the light rays are reflected, so eyes of nocturnal animals are glowing at night.
	e. through which the collected information from eyes are processed.

1. ....

2. ....

3. ....

4. ....

**3 Put (✓) or (✗) :**

- 1. Human can see in dim light better than in bright light. ( )
- 2. Light is the only form of energy that is needed to see the surroundings. ( )
- 3. In a complete dark room, you can use the senses of touching, tasting, smelling and hearing only. ( )
- 4. Horses, deers, dogs and cats, all have a mirror-like membrane in their eyes. ( )
- 5. If human have a tapetum lucidum, then he can see in dim light as well as in bright light. ( )

**4 Write the scientific term of each of the following :**

- 1. The visible form of energy, that enable us to see. (.....)
- 2. The organ of vision, which receives light that reflected from the surrounding objects. (.....)
- 3. The life-saving structural adaptation that gives fishing cat excellent night vision. (.....)

**5 Correct the underlined words :**

- 1. Sound is a visible form of energy, that bounce off objects into our eyes. (.....)
- 2. Eyes send messages to the heart, for processing information. (.....)
- 3. In a completely dark room everything look red, due to the absence of light. (.....)
- 4. Tapetum lucidum in nocturnal animals, is considered as behavioral adaptation. (.....)

**6 Complete the following sentences :**

- 1. Some nocturnal animals have a mirror-like membrane on the back of their eyes called .....
- 2. Tapetum lucidum helps some animals have an spectacular night vision which is considered ..... adaptation.
- 3. Cats can hunt at night as they have a special membrane in their eyes known as ....., while bats can hunt at night as they use the ..... property.
- 4. Tapetum lucidum ..... light in the eyes of nocturnal animals like a mirror.
- 5. We can see eyes of cats glow at night due to the reflection of ..... from tapetum lucidum layer.
- 6. If the eyes of bats have tapetum lucidum membrane, so they will have super senses of ..... and .....
- 7. Your brain receives messages from the sensory receptors in your ..... after the light bounces off an object to see it.
- 8. Most animals can hunt when ..... bounces off a prey into their eyes, while bats can hunt when ..... bounces off a prey into their .....

**7** Give reasons for :

- 1. Importance of tapetum lucidum for some nocturnal animals.

- 2. The eyes of human not glow like cats in dark.

**8** What happens if ... ?

- 1. Light does not bounce off an object into our eyes.

- 2. Snakes have tapetum lucidum layer in their eyes.

**9** Classify which of the following animals have super sight sense and which of them have super hearing sense.

"Arctic fox – Fishing cat – Dolphin – Tarsier – Bat"

Animals have super sight sense	Animals have super hearing sense
.....	.....
.....	.....
.....	.....
.....	.....

**Exercises on Lesson****4****1 Choose the correct answer :**

- 1. The light waves travel in the air as .....
  - a. curved lines.
  - b. zigzag lines.
  - c. straight lines.
  - d. circular lines.
  
- 2. When light rays hit an object, all the following sentences are correct, except .....
  - a. some of this rays is absorbed by the object.
  - b. some of this rays is bounced off the object.
  - c. some of this rays may go through the object.
  - d. some of this rays reflects to our ears causing hearing.
  
- 3. When light hits an object, a shadow of this object is formed because .....
  - a. light can pass through the object.
  - b. light cannot pass through the object.
  - c. this object reflects light.
  - d. this object is a transparent object.
  
- 4. Opaque material .....
  - a. allows light to pass through.
  - b. absorbs some of light that fall on it only.
  - c. bounces off some of light that fall on it only.
  - d. absorbs some of light that fall on it and bounces off the other.
  
- 5. All of the following are transparent objects, except .....
  - a. glass.
  - b. water.
  - c. paper.
  - d. air.
  
- 6. You cannot see through all the following objects, except .....
  - a. human body.
  - b. polished mirror.
  - c. painted surface.
  - d. a glass of water.
  
- 7. Opaque objects and transparent objects are characterized by .....
  - a. both of them reflect all falling light.
  - b. both of them allow all falling light to pass through.
  - c. both of them absorb all falling light.
  - d. transparent objects allow most of light to pass through, while opaque objects don't.
  
- 8. Painted surface ..... the incoming light rays.
  - a. allows to pass
  - b. absorbs only
  - c. reflects only
  - d. absorbs and reflects
  
- 9. Polished mirror, causes falling light rays
  - a. to pass through it.
  - b. to reflect at the same angle they struck the polished mirror.
  - c. to reflect at different directions they struck the polished mirror.
  - d. to diffuse like that of rough surfaces.

- 10. Our eyes, .....
  - a. can see both opaque and transparent objects.
  - b. cannot see both opaque and transparent objects.
  - c. can see opaque objects, while transparent objects cannot be seen.
  - d. can see transparent objects, while opaque objects cannot be seen.
  
- 11. If the passed light rays from a transparent objects is fallen on an opaque object, then the opaque object ..... through the transparent object.
  - a. absorbs all light rays, so we can see it
  - b. don't reflect any light rays, so we cannot see it
  - c. reflects some light rays, so we can see it
  - d. reflects some light rays, so we cannot see it
  
- 12. If there are two sheets, one made of wood in front of the second that made of glass, .....
  - a. you can see the glass sheet through the wood sheet.
  - b. you cannot see the wood sheet through the glass sheet.
  - c. you can see the wood sheet through the glass sheet.
  - d. the light can pass through both sheets.

**2** Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Polished mirror	a. It is a transparent matter, that allows light to pass through.
2. Piece of cloth	b. It is considered as a source of light, that present in the sky.
3. Reflected light	c. It is a rough surface, that scatter reflected light rays.
4. Moon	d. It is the light, that bounces off a reflecting surface.
5. lenses	e. It is a smooth shiny surface, that reflects most of falling light.
	f. It doesn't consider as a source of light, that present in the sky.

1. .... 2. .... 3. .... 4. .... 5. ....

**3** Put (✓) or (✗) :

- 1. Transparent objects includes air, water, polished mirror, glass and lenses. ( )
- 2. Rough objects tended to reflect light better than smooth objects. ( )
- 3. Both wooden block and paper reflect incoming light rays at the same angle at which they struck them. ( )
- 4. Polished mirror reflects all incoming light rays that fall on it. ( )
- 5. We see the transparent object, when the light rays that passes through it fall on our eyes. ( )
- 6. Air doesn't form shadow, as it is a transparent material. ( )

- 7. The absorbed light rays by an object, don't reflected on our eyes. ( )
- 8. The light reflection increases, when the smoothness of the surface increases. ( )
- 9. The light reflection depends on smoothness of the object's surface. ( )

**4** Write the scientific term of each of the following :

- 1. Materials that allow light to pass through. (.....)
- 2. Materials that we cannot see through it. (.....)
- 3. A transparent material, that surrounds us every where and we use it in breathing. (.....)
- 4. A type of surface, that reflects light in different directions at which they struck it. (.....)

**5** Correct the underlined words :

- 1. If you want to hide from a predator, you have to stand behind a transparent material. (.....)
- 2. We see the objects as a result of the absorbed light rays on our eyes. (.....)
- 3. Opaque materials includes water, glass, air and lenses. (.....)
- 4. Rough objects reflect light at the same angle at which they struck the object. (.....)
- 5. Windows are made of wood, as it is a transparent material that allows sunlight to pass through. (.....)

**6** Complete the following sentences :

- 1. Light travels in ..... line.
- 2. Light and sound travel in the form of .....
- 3. Objects that light can't pass through are called ....., while objects that allow light to pass through are called .....
- 4. A tree form a shadow as it is an ..... object that don't allow ..... to pass through.
- 5. Cloth and paper are considered ..... surfaces that scatter or diffuse ..... energy.
- 6. Plastic, wood and ..... are considered ..... materials which light to pass through.
- 7. Rough materials reflect light less than ..... materials and more than materials.
- 8. Things can be seen through ..... objects such as ..... and .....

**7** Give reasons for :

- 1. Shadow of an opaque body is formed when light falls on it.

- 2. You can see an object placed behind a glass cup.

- 3. Our bodies always forms a shadow in the presence of light.

- 4. Mirror can reflect the light better than a painted surface.

### 8 What happens if ... ?

- 1. You place an opaque object between a light source and a wall.

- 2. Light falls on a transparent body such as a glass window.

- 3. Light falls on a rough surface according to the reflected light rays.

- 4. Light falls on a mirror that has few cracks.

### 9 Arrange the following statements to show the correct sequence of how humans see different objects :

(.....) Special nerves in the eyes send messages to the brain.

(.....) The reflected light travels in a straight line into the eyes.

(.....) The brain interprets the messages as an image.

(.....) Light waves bounce off objects around us.

**10** Look at the following figures, then answer the questions below :

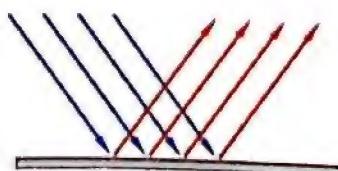


Fig. (a)

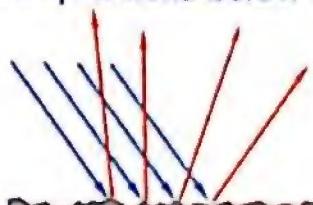


Fig. (b)

**1.** Complete :

- The surface in fig. (a) is .....  
- Because .....
- The surface in fig. (b) is .....  
- Because .....
- In two figures the falling and reflected rays shows that light travels in ..... line.

**2.** Choose :

The surface in fig. (a) may be .....

- a. plastic.      b. wood.      c. mirror.      d. glass.

**11** Classify the following materials into smooth materials and rough materials :

" Piece of cloth – Mirror – Wood – Metal – Paper "

Smooth materials	Rough materials
.....	.....
.....	.....
.....	.....

**12** Classify the following materials into opaque objects and transparent objects :

" Wood – Air – Water – Metal – Lenses "

Opaque objects	Transparent objects
.....	.....
.....	.....
.....	.....

**Exercises on Lesson 6****1 Choose the correct answer :**

- 1. The reflected light rays from an object enter the eye through .....
  - a. eye socket.
  - b. eye pupil.
  - c. tapetum lucidum.
  - d. blood vessels.
- 2. There is a ..... inside your eye, that redirects the entered light rays.
  - a. black paper
  - b. white paper
  - c. lens
  - d. mirror
- 3. The right path of the light rays, that is reflected from an object on our eyes causing vision is .....
  - a. eye lens – eye pupil – brain – back of the eye.
  - b. eye pupil – brain – eye lens – back of the eye.
  - c. brain – back of the eye – eye pupil – eye lens.
  - d. eye pupil – eye lens – back of the eye – brain.
- 4. The eye lens redirects the entered light rays, where all redirected rays are collected in ..... on the back of the eye.
  - a. one point
  - b. two points
  - c. three points
  - d. four points
- 5. As the eye lens can redirect the entered light rays, so this lens must be .....
  - a. an opaque material.
  - b. a transparent material.
  - c. a reflecting material.
  - d. a mirror-like.
- 6. All of the following are correct about the function of the eye lens, except it ..... the entered light rays.
  - a. collects
  - b. focuses
  - c. diffuses
  - d. concentrates
- 7. If the eye lens is made up of an opaque material, then this eye .....
  - a. can see the near objects only.
  - b. can see the far objects only.
  - c. can see both the far and the near objects.
  - d. cannot see any objects around it.
- 8. The organism that has no eyes in the following species, is .....
  - a. tarsier monkey.
  - b. golden frog.
  - c. barbary fig.
  - d. bull shark.

**2** Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Eye pupil	a. It diffuses the entered light rays in different directions.
2. Eye lens	b. It is a structural adaptation, that gives fishing cat an excellent night vision.
3. Eye socket	c. It concentrates the light rays on a single point.
4. Tapetum lucidum	d. It is the opening through which the light enters the eye.
	e. It is the place in which the eye can move inside as in human.

1. ....

2. ....

3. ....

4. ....

**3** Put (✓) or (✗) :

- 1. The eye lens acting as a magnifying glass. ( )
- 2. The person have an excellent vision, if his eyes doesn't focus the entered light ray properly. ( )
- 3. The person who can test either the eye lens is focusing properly or not, is the biologist. ( )
- 4. The eye lens diffuses the falling light rays on the eye, onto the back of the eye. ( )
- 5. To correct your vision defects, the optometrist may advice you with glasses or contact lenses or laser surgery. ( )

**4** Write the scientific term of each of the following :

- 1. The part in the eye structure, that redirects the falling light rays on the back of the eye. ( ..... )
- 2. A type of glass that concentrates the sun rays on a single point. ( ..... )
- 3. The person who test our eyes to detect whether its lens is focusing properly or not. ( ..... )
- 4. The condition in which the person loses his sight completely. ( ..... )

**5** Complete the following sentences :

- 1. Magnifying glass is similar to the ..... in your eye in focusing the light in a point.
- 2. When the lens in your eye can't focus the light properly this causes ..... vision.
- 3. Some people are not able to see ..... objects, while some other people are not able to see ..... objects.
- 4. Optometrists correct the vision by using ..... or ..... surgery.

- 5. Optometrists study ..... to know how to prevent ..... , treat ..... and correct vision.
- 6. The lens in your eye ..... the light in a point, while the tapetum lucidum membrane in cat's eyes ..... the light.

### 6 Give reasons for :

- 1. The lens in our eyes is very importance.
- 2. Some people have blurry vision.

### 7 What happens if ... ?

1. Place a magnifying glass above a piece of paper in the sun rays.

2. Light rays falls on your eye's lens.

3. Optometrist found a patient suffers from blurry vision (according to types of treatment).

### 8 Look at the opposite figure, then answer the questions :

1. Draw arrows to show the directions of light rays, that causes the human's eye to see the ball and also the source of light.

A ball

Source of light

2. What happens after the light enters the eyes ?

Human's eye

9 Complete the following table :

Human's eyes	Fishing cat's eyes	Owl's eyes	Chameleon's eyes
They have ..... to focus the light in a ..... onto the back of their eyes	Its eyes seem to ..... in darkness as they have ..... that bounces off the light.	It has ..... eyes that can't move in their .....	It has eyes that can see in two ..... directions at the same time.

10 Answer the following questions by using the following words (you may use each word many times).

(Human – Fishing cat – Owl – Chameleon)

1. Which of them can make camouflage adaptation ?

.....

2. Which of them has tapetum lucidum layer ?

.....

3. Which of them can move its head in all directions to see its prey ?

.....

4. Which of them can use a night vision goggles to see at nighttime ?

# Exercises

## on Lessons of Concept (1.4)

● Understand

● Apply

● Analyze

● Evaluate

● Create

### Exercises on Lesson

1

#### 1 Choose the correct answer :

- 1. A firefly is not a bird, but it is a type of .....  
a. amphibians.      b. lizards.      c. beetles.      d. reptiles.
- 2. Which of the following is not a reason that fireflies produce a flash light ?  
a. To attract a mate.      b. For communication.  
c. To warn off predators.      d. To see in the dark.
- 3. Changing the pattern of lighting up in a firefly is an example of .....  
a. structural and behavioral      b. physical and behavioral  
c. only structural      d. only behavioral
- 4. All of the following ways can be used to communicate between people except .....  
a. reading.      b. writing.      c. speaking.      d. flying.
- 5. The ability to communicate through language and speech separates ..... from animals.  
a. humans      b. animals      c. plants      d. non living things
- 6. Ancient ..... created hieroglyphs in central America that included 800 different signs.  
a. Egyptians      b. Chinese      c. Mayans      d. Greeks
- 7. Reading and writing are common types of communication in ..... world.  
a. humans      b. animals      c. birds      d. plants
- 8. Displaying light is a type of communication that is found in both .....  
a. plants and animals.      b. plants and humans.  
c. animals and humans.      d. animals.

#### 2 Choose from column (B) what suits it in column (A) :

- 1.

(A)	(B)
1. Mayans	a. used papyrus plant in writing.
2. Egyptians	b. used mulberry and bamboo plants in writing.
3. Babylonians	c. were found in Europe.
4. Chinese	d. were found in central America. e. created cuneiform drawing.

1. ....

2. ....

3. ....

4. ....

2.

(A)	(B)
1. Watching TV	a. is a type of communication in plants only.
2. Echolocation	b. is a type of communication in animals only.
3. Displaying light	c. is a type of communication in human only.
	d. is a type of communication in both animals and humans.

1. .... 2. .... 3. ....

**3 Put (✓) or (✗) :**

- 1. Fireflies produce flash light to warn off predators. ( )
- 2. Whales can communicate with each other by using songs. ( )
- 3. Fireflies are wingless beetles. ( )
- 4. It is possible for a human to interact with fireflies. ( )
- 5. Speaking is the only way to communicate with people. ( )
- 6. Communication messages should be in a language that is understandable to both the sender and the receiver. ( )
- 7. Echolocation is a type of communication between owls. ( )

**4 Correct the underlined words :**

- 1. Fireflies produce a physical reaction inside their bodies that allows them to light up. (.....)
- 2. Fireflies produce flash lights using their eyes. (.....)
- 3. Cuneiform drawings is a writing system that is created by ancient Egyptians. (.....)
- 4. The ancient Egyptians created a form of paper using the mulberry and bamboo plants. (.....)
- 5. A cell phone is a device that is used in communication between animals. (.....)

**5 Write the scientific term of each of the following :**

- 1. A type of beetles that produce flash light using their wings. ( )
- 2. An ancient Egyptian language created for writing and included 700 symbols. ( )
- 3. A writing system created by Babylonians in Iraq in the past. ( )
- 4. A kind of paper that is created by ancient Egyptians for writing. ( )
- 5. They created a form of paper using the inner bark of mulberry and bamboo trees. ( )

**6** Complete the following sentences :

- 1. Fireflies use the sense of ..... to communicate with each other, while whales communicate with each other by the sense of .....
- 2. Whales use songs to ..... with each other, while fireflies produce flash lights by using their wings to attract .....
- 3. Fireflies communicate with each other by producing ..... inside their bodies that make them light up and using their ..... to flash.
- 4. A group of fireflies can change their own ..... to match the flash of the other group to communicate.
- 5. Humans are separated from animals by their ability to communicate through ..... and .....
- 6. The ancient Egyptians use a type of paper known as ..... for writing their language to communicate with each other.
- 7. Dolphins communicate with each other by the sense of ..... , while Egyptian mongooses communicate with each other by making different .....
- 8. Watching TV is a type of communication that use the senses of ..... and .....
- 9. Echolocation is a type of communication that depends on the sense of ..... , and it used by some animals such as ..... and .....
- 10. Among the types of communication that are used by humans only are ..... and .....
- 11. Among the types of communication that are used by both animals and humans are ..... and .....

**7** Give reasons for :

- 1. Human receives and sends information through speaking, writing and reading.  
.....
- 2. Fireflies use different patterns of flash lights to communicate with each other.  
.....
- 3. Whales produce different tones that make music.  
.....
- 4. Fireflies produce a special chemical reaction inside their bodies.  
.....

**8** What happens if a person makes flashing pattern by LED lights near to a group of fireflies ?  
.....

- 9** Write the senses that used in this type of communication in front each sentence in the following table :

Type of communication	The used senses
1. Watching TV.	.....
2. Flashing lights of fireflies.	.....
3. Echolocation in dolphins.	.....
4. Using the cell phone.	.....

- 10** Look at the following figures, then put (✓) or (✗) :



Figure (1)



Figure (2)

1. The sense that is used to communicate in figure (1) is sight only. ( )
2. The sense that is used to communicate in figure (2) is hearing only. ( )
3. The type of communication in both figures can be used by humans. ( )
4. The type of communication in figure (1) can be used by animals only. ( )
5. The type of communication in figure (2) can be used by humans only. ( )

**Exercises on Lesson**

2

**1 Choose the correct answer :**

- 1. Humpback whales sing during ..... months, which is the mating season.  
a. winter      b. summer      c. spring      d. autumn
- 2. Songs of humpback whales in winter are characterized by each of the following except .....  
a. having high-pitched sounds.      b. moving better through cold water.  
c. having soft sounds.      d. having low-pitched sounds.
- 3. All of the following are forms of codes except .....  
a. thump up and down hands.      b. expressions of faces.  
c. writing.      d. swimming.
- 4. When your eyes see a red traffic light, it sends a signal to you to .....  
a. increase your speed.      b. decrease your speed.  
c. keep your speed as it is.      d. stop.
- 5. People use a rescue flare to communicate with each other depending on the sense of .....  
a. hearing.      b. sight.      c. smell.      d. touch.
- 6. Sense organs collect information and send it to ..... for processing and understanding.  
a. hands      b. legs      c. brain      d. stomach

**2 Choose from column (B) what suits it in column (A) :**

(A)	(B)
1. High-pitched sound	a. is produced by humpback whales in summer.
2. Low-pitched sound	b. is produced by humpback whales in winter.
3. Thumbs-up	c. is a code that means that you are in a danger.
4. Thumbs-down	d. is a code that means that you say "Yes". e. is a code that means that you say "No".

1. ....      2. ....      3. ....      4. ....

**3 Put (✓) or (✗) :**

- 1. Animals communicate with each other by using different senses. ( )
- 2. Fireflies communicate with each other through songs. ( )
- 3. Whales communicate with each other through flashing. ( )
- 4. Humpback whales produce more than one type of songs. ( )
- 5. Humpback whales can sing under water. ( )

- 6. The voice of man is rough as it has high-pitched sound. ( )
- 7. Sense organs can decode the information that is sent by brain. ( )
- 8. Expressions on faces are codes that can help people predict our feelings. ( )

**4** Correct the underlined words :

- 1. Humpback whales have similar sounds according to the season. (.....)
- 2. Humpback whales produce low-pitched sounds in winter. (.....)
- 3. Low-pitched sounds travel better through cold water. (.....)
- 4. The voice of woman is soft as it has low-pitched sound. (.....)
- 5. Sound pitch of humpback whales increases in winter as it is the feeding season. (.....)
- 6. Different languages have similar codes. (.....)
- 7. Light travels very slow over distances. (.....)
- 8. Light houses encode information flashes of light that tell pilots where they are. (.....)

**5** Write the scientific term of each of the following :

- 1. A season in which the humpback whale produces high-pitched sound. (.....)
- 2. A season in which the humpback whale produces low-pitched sound. (.....)
- 3. Pitched sounds which travel in cold water better than in warm water. (.....)
- 4. Pitched sounds which travel in warm water better than in cold water. (.....)
- 5. Sense organ that can detect sound energy. (.....)
- 6. Sense organ that can detect light energy. (.....)
- 7. It is information that transformed into another representative form. (.....)

**6** Complete the following sentences :

- 1. Humpback whales communicate with each other by using the sense of ..... , where they sing a wide range of ..... and a series of .....
- 2. The songs that whales sing are differ between ..... months and .....
- 3. According to humpback whales, the winter months are considered as the season of .....

- 4. In winter, the songs of humpback whales have ..... pitched sound, because this sounds travel better through ..... water.
- 5. In ..... months, the songs of humpback whales have ..... pitched sound, because this sounds travel better through warm water.
- 6. Humans can communicate with each other where, ears of human detect ..... energy, and eyes of human use ..... energy.
- 7. When you see your friend waving at you from a distance, you use ..... energy that enters your ..... to gather information.
- 8. Fireflies use ..... energy in their communication, while dolphins and whales use ..... energy to communicate with each other.
- 9. Language and music are codes that use the sense of ..... to communicate.
- 10. Writing is a code that uses the sense of ..... to communicate.

**7** Give reasons for :

- 1. The songs of humpback whales have high-pitched sounds during winter months.  
.....
- 2. Humpback whales sing different songs.  
.....
- 3. The symbols that are used in writing have a specific pattern.  
.....
- 4. We use the expressions on faces during talking with each other.  
.....
- 5. When the sense organs receive information from the surrounding environment, they send it to the brain.  
.....

**8** What happens if ... ?

- 1. The summer months started according to the communication of whales.  
.....
- 2. The hearing sense of whales becomes weak.  
.....
- 3. The traffic light becomes red while you are going to cross the road.  
.....

**9** Look at the following figures, then complete the following sentences :

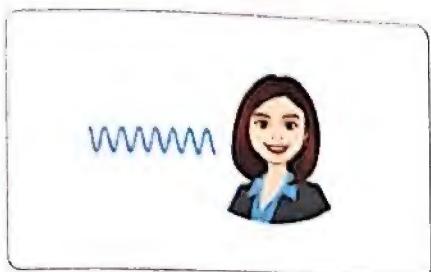


Figure (1)

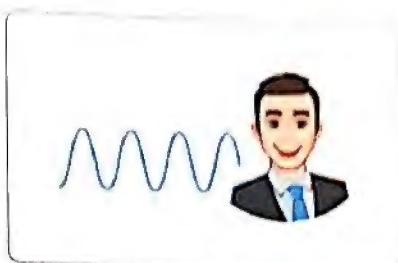


Figure (2)

1. Low-pitched sound is produced from the human in figure (.....).
2. High-pitched sound is produced from the human in figure (.....).
3. The voice that is produced in figure (.....) is similar to the voice of whales in summer season.
4. The voice that is produced in figure (.....) is similar to the voice of whales in winter season.
5. The voice in figure (.....) travels better through cold water.
6. The voice in figure (.....) travels better through warm water.

**10** Look at the opposite picture, then answer the following questions :

"The person in this picture uses light to land the plane safely"



1. What is the sense and the organ that the pilot uses in this picture to communicate ?
- .....

2. Mention another example for using the light in communication between people.
- .....

## Exercises on Lesson

3

### 1 Choose the correct answer :

- 1. Different ..... represent different letters of alphabet in Morse code.
  - a. symbols and figures
  - b. symbols and dashes
  - c. figures and dots
  - d. dashes and dots
- 2. Morse code consists of ..... beeps known as dots and ..... beeps known as dashes.
  - a. short, short
  - b. long, long
  - c. short, long
  - d. long, short
- 3. In Morse code, long flashes can be used instead of .....
  - a. dots only.
  - b. dashes only.
  - c. both dots and dashes.
  - d. neither dots nor dashes.
- 4. In Morse code, short flashes can be used instead of .....
  - a. dots only.
  - b. dashes only.
  - c. both dots and dashes.
  - d. neither dots nor dashes.
- 5. If two persons communicate with each other by Morse code using light flashes, this means that the sender and the receiver will depend on the sense of ..... in their communication.
  - a. hearing
  - b. sight
  - c. taste
  - d. smell

### 2 Put (✓) or (✗) :

- 1. Morse code is a communication system that is used by fireflies. ( )
- 2. Morse code may use long and short flashes of light instead of long and short beeps. ( )

### 3 Write the scientific term of each of the following :

- 1. A communication system developed by Samuel Morse in the 19<sup>th</sup> century. (.....)
- 2. The short beeps in Morse code. (.....)
- 3. The long beeps in Morse code. (.....)

### 4 Complete the following sentences :

- 1. Morse code is a ..... system that depends on ..... energy.
- 2. Morse code is a ..... code consists of ..... beeps and ..... beeps.
- 3. The long beeps in Morse code known as ..... while the short beeps known as .....
- 4. Morse code can use light instead of sound where, long flashes represent ..... while ..... flashes represent dots.

- 5** The opposite table shows some encoded letters according to Morse code where, short beep means a dot and long beep means a dash.

a. Try to decode the following word that is represented by the following code.

1. Short beep, long beep → Letter ① is .....
2. Long beep, 2 short beep → Letter ② is .....
3. Short beep, long beep → Letter ③ is .....
4. Short beep, 2 long beep, short beep → Letter ④ is .....
5. Long beep → Letter ⑤ is .....
6. Short beep, long beep → Letter ⑥ is .....
7. Long beep → Letter ⑦ is .....
8. 2 short beep → Letter ⑧ is .....
9. 3 long beep → Letter ⑨ is .....
10. long beep, short beep → Letter ⑩ is .....

b. Finally, the decoded word is .....

A	H	D	!
N	O	P	T

**Exercises on Lesson**

4

**1 Choose the correct answer :**

- 1. The way by which bees can communicate with each other is .....  
a. echolocation.    b. flash lights.    c. dancing.    d. Morse code.
- 2. The bee can rotate around itself in the form of number ..... as an encoding message for other bees.  
a. 2                      b. 4                      c. 6                      d. 8
- 3. The scout honeybee makes ..... round dance if the flower is very close.  
a. 1                      b. 2                      c. 3                      d. 4
- 4. The scout honeybee performs a waggle dance in the direction ..... if the flower is a little further away.  
a. right-left            b. up-down            c. right-down            d. left-up
- 5. All of the following are examples of communication electronic devices except .....  
a. T.V.                    b. a computer.            c. a cell phone.            d. a knife.
- 6. Sending smelly messages when there is a shortage of food is the function of .....  
a. queen ants.            b. nurse ants.            c. scout ants.            d. soldier ants.
- 7. Locating food is the function of .....  
a. queen ants.            b. nurse ants.            c. scout ants.            d. soldier ants.
- 8. Protecting the colony from dangers is the function of .....  
a. queen ants.            b. nurse ants.            c. scout ants.            d. soldier ants.

**2 Choose from column (B) what suits it in column (A) :**

(A)	(B)
1. Nurse ants	a. are responsible for reproduction and laying eggs.
2. Scout ants	b. are responsible for warning from dangers.
3. Soldier ants	c. are responsible for locating food. d. are responsible for sending messages when the amount of food decreases.

1. ....

2. ....

3. ....

**3 Put (✓) or (✗) :**

- 1. People with special needs use sign language to communicate. ( )
- 2. Movement of your head or hand is not a way of communication with your friends. ( )
- 3. Bees use flash lights to communicate with each other. ( )
- 4. Computers and cell phones are considered as parts of communication systems that depend on signals in their work. ( )

- 5. Satellites work to transfer information from one place to another. ( )
- 6. A cell phone by itself can help you to talk to your friends without any need to other communication parts. ( )
- 7. Animals use technological systems as we do. ( )

**4 Correct the underlined words :**

- 1. In the hive, bees can communicate to find waste and water. (.....)
- 2. The dancing bee moves in a figure-six pattern, while vibrating its wings. (.....)
- 3. Scout honeybees use codes with movements to communicate with other bees that receive these codes through hearing. (.....)
- 4. Humans have designed and used communication systems to make communication more difficult. (.....)
- 5. Groups of ants within a colony have similar roles. (.....)
- 6. Scout ants are responsible for protecting the colony from dangers. (.....)

**5 Write the scientific term of each of the following :**

- 1. Honeybees which are responsible for searching out food sources. (.....)
- 2. The sense by which bees receive movement codes that are sent by the scout honeybees. (.....)
- 3. Small living organisms that live in colonies and perform different roles, some are nurses, some are scouts and some are soldiers. (.....)
- 4. A group of ants which is responsible for sending smelly messages when there is a shortage of food. (.....)
- 5. A group of ants which is responsible for protecting the colony from dangers. (.....)

**6 Complete the following sentences :**

- 1. Honeybees use movements in their communication to find ..... resources and ..... resources.
- 2. The bee dances in a figure-eight pattern while vibrating its ..... , and the other bees read the ..... of the dancer and then fly off to the specific location.
- 3. The people with special needs use movements to communicate with each other by a language called .....
- 4. The sense that the bee uses to receive the dancing code from the dancer bee is ..... sense.
- 5. Ants within a colony divided into several groups such as ..... ants, ..... ants and ..... ants, where each group do a specific role.
- 6. Ants use their sense of ..... to communicate with each other, while bees use ..... by doing a special dances to communicate with each other.

- 7. A group of ants sends ..... messages to communicate with each other.
- 8. Ants are similar to the ..... tree in that both of them send a smelly messages for communication.
- 9. The role of ..... ants is sending smelly messages to scout ants if the food is low, while the role of ..... ants is sending smelly messages in case of danger.
- 10. Both of honeybees and fireflies use the sense of ..... in their communication.

**7 Give reasons for :**

- 1. A honeybee uses figure-eight pattern movement during communication with other bees.
- 2. The cell phone by itself cannot help you to communicate with your friends.
- 3. The ant's colony contains groups of ants that have different roles.
- 4. The nurse ants send smelly messages to scout ants.
- 5. The soldier ants use smells in their communication.

**8 What happens if ... ?**

- 1. The bees in the hive didn't understand the movements of the dancer bee.
- 2. A person with special needs doesn't learn the sign language.
- 3. The smell sense of ants becomes weak.
- 4. The amount of food in the ant's colony decreases.
- 5. There is a danger near to an ant's colony.

9 Look at the following figures, then complete the following sentences :

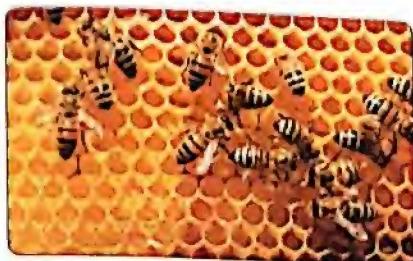


Figure (1)



Figure (2)

1. Insects of figure (.....) communicate with the sense of smell, while insects of figure (.....) use the sense of sight to communicate.
2. Insects in figure (.....) make a special dance to tell the same other insects where to find their food and water.
3. Insects in figure (.....) send smelly messages to the same other insects to tell them where to find the food.

10 Read the words between brackets, then answer the following questions :

(Cell phone – Satellites – Communication towers – Software)

1. What is the relation between the parts that mentioned between the previous brackets ?  
.....
2. Does the software only help you to communicate with your friend ?  
Give a reason for your answer.  
.....

## Exercises on Lesson 5

**1 Choose the correct answer :**

- 1. Bats use their ..... to get information about their surroundings in the dark.  
a. nose      b. tongue      c. eyes      d. ears
- 2. Echolocation is the use of ..... -pitched sounds for finding food.  
a. medium      b. low      c. very low      d. high
- 3. ..... use echolocation by bouncing high-pitched sounds in the air.  
a. Bats      b. Dolphins      c. Whales      d. Snakes
- 4. The echo turns into ..... that a blind man can feel in his thumb while holding his special cane.  
a. vibrations      b. light      c. heat      d. electricity
- 5. The blind person's cane and ..... emit a high-pitched sound that bounces off objects forming an echo.  
a. lizards      b. polar bears      c. bull sharks      d. bats

**2 Put (✓) or (✗) :**

- 1. Humans and animals can communicate and transfer information using sound, light and movements. ( )
- 2. It is impossible to design technology inspired by the behaviors of some living organisms that surround us. ( )
- 3. A special cane is created to help a person who has lost the sense of hearing. ( )
- 4. The sound pitch of a blind person's cane is too high for humans to hear. ( )
- 5. The echo turns into light that a blind man can feel while holding his special cane. ( )
- 6. Bats have the ability to change the echo into vibrations just as the canes of blind persons do. ( )

**3 Write the scientific term of each of the following :**

- 1. A living organism that can fly and it depends on the echolocation property for getting information about their surroundings in the dark. (.....)
- 2. The sense that has a problem with the blind person. (.....)
- 3. A simple tool (device) used by blind people to walk safely. (.....)
- 4. Living organisms that make a series of movements and vibrations with their wings to communicate flower location. (.....)

**4** Complete the following sentences :

- 1. Fireflies use ..... to communicate, whales use ..... to communicate, while human can use both of them to communicate.
- 2. Scientists make a special cane to help blind people, this cane is inspired from ..... animal.
- 3. Bats is similar to whales in that both of them use ..... sound in their communication.
- 4. Bats and the special cane of blind people are similar in using ..... property to locate objects.
- 5. Honeybee vibrates its ..... to tell other bees the location of flowers, and the cane of a blind person makes a series of ..... to tell him where objects around him are located.
- 6. Both of blind people canes and dolphins produce ..... sound that hits the objects and then bounces back to them in the form of .....
- 7. The sound waves that picked up by the cane of a blind person is turned into ..... that the person can feel them with his .....

**5** Give reasons for :

- 1. The echo that is picked up by the cane of blind people is turned into vibrations.
- 2. The purpose of vibration in a blind person's cane is the same purpose of the vibration of honeybee wings.

**6** What happens if ... ?

- 1. High-pitched sound that is produced by the blind person's cane hits an object.
- 2. Bats cannot use echolocation property.
- 3. There is a wall in front of a blind person uses his special cane.

**7** Cross out the odd words :

- |   |         |
|---|---------|
| 1. Bats – Whales – Honeybees – Dolphins.              | (.....) |
| 2. Bats – Fireflies – Blind person's cane – Dolphins. | (.....) |

**8** Look at the following figures then complete the following sentences :



Figure (1)



Figure (2)



Figure (3)

- Figures (1) and (2) are similar in that both of them depend on echolocation property.

  - Figure (.....) is similar to figure (.....) in that both of them depend on echolocation property.
  - Figure (.....) is similar to figure (.....) in that both of them make vibration to deliver the communication messages.
  - Figure (.....) differs from figure (2) in that the animal in figure (2) doesn't change the echo into vibration.

**9** Mention two devices that humans have vision problems can use to

- communicate with their surroundings, where the ideas of these two devices are inspired from some animal adaptations, and mention the name of these two animals.

**Part  
2**

# **Self-Assessments**



# Contents

THEME ONE : **Systems**

## UNIT ONE : Living Systems

<b>Concept</b> <b>1.1</b>	<b>Adaptation and Survival :</b>	
	- Self-Assessments from (1) to (6)	109 - 115
	- Model Exam on Concept (1.1)	116
 <b>Concept</b> <b>1.2</b>	<b>Senses at Work :</b>	
	- Self-Assessments from (7) to (11)	118 - 123
	- Model Exam on Concept (1.2)	124
 <b>Concept</b> <b>1.3</b>	<b>Light and Sight :</b>	
	- Self-Assessments from (12) to (16)	126 - 131
	- Model Exam on Concept (1.1)	132
 <b>Concept</b> <b>1.4</b>	<b>Communication and Information Transfer :</b>	
	- Self-Assessments from (17) to (21)	134 - 138
	- Model Exam on Concept (1.2)	139
	- Model Exam on Theme (1)	141

## Self-Assessment 1 On Lesson 1

### 1 (A) Choose the correct answer :

1. Which of the following statements is correct ? .....
  - a. Starred agama lizard live in extreme cold weather.
  - b. Penguins have no feathers on their feet.
  - c. Forest bears blend in with snow throw their white fur.
  - d. Caracals have colorful scales to adapt their desert landscape.
2. The different colors of fur in different types of bears help them to .....
  - a. respire in their environment.
  - b. adapt their habitat.
  - c. communicate with other animals.
  - d. look for shade areas.
3. Which of the following sentences doesn't represent the camouflage adaptation .....
  - a. thick downy feathers of penguins.
  - b. white fur of polar bears.
  - c. colored scales of some lizards.
  - d. sandy-colored fur of fennec foxes.

### (B) Give a reason for the following :

Some types of lizards that live in rocky areas have colorful scales.

.....

.....

.....

### 2 (A) Put (✓) or (✗) :

1. The bodies of fennec foxes, penguins and caracals are adapted to live in extreme hot climate. ( )
2. Penguins have special blood vessels in their feet that help them survive in polar regions. ( )
3. The brown fur of the polar bear helps it to blend in with snow. ( )

### (B) What happens if ... ?

Forest bears are coated with white fur.

.....

.....

.....

**3** Look at the following figures, then answer the questions below :

1. Which figure shows the correct structure of blood vessels in the penguin's feet ?



Figure (a)



Figure (b)

2. What would happen if the penguin has the structure of blood vessels shown in figure (a) ?

### Self-Assessment 2 till Lesson 2

**1** (A) Complete the following sentences :

- White fur of polar bears is considered as ..... adaptation, while the panting in fennec foxes is considered as ..... adaptation.
- Long sticky ..... helps the panther chameleon to hunt, while dark ..... helps forest bear to stay hidden to hunt.
- Camouflage in fennec foxes takes place through their ..... colored fur, while in polar bears camouflage takes place through their ..... colored fur.

(B) What happens if ... ?

Bull sharks have white back and dark belly.

**2** (A) Correct the underlined words :

- Arctic foxes have extra-large ears that help them stay warm. (.....)
- Bull sharks can live in salt water only. (.....)
- Panther chameleon has a very long sticky feet to hunt insects for feeding. (.....)

(B) Complete the following sentences by choosing the correct answer from those between brackets :

- Polar bear can live in (**cold – hot**) regions, as it has (**thick white – thick brown**) fur.
- Short ears of the arctic fox is considered as (**structural – behavioral**) adaptation, while the panting of fennec fox is considered as (**structural – behavioral**) adaptation.
- Arctic fox can live in (**cold – hot**) regions, and also it has (**short – large**) ears.

**3** Give two examples of animals which their bodies are covered by brown fur and mention the importance of this fur for each of them :

1. First animal is .....  
Brown fur helps it to .....

2. Second animal is .....  
Brown fur helps it to .....

### Self-Assessment 3 till Lesson 3

**1** (A) Choose the correct answer :

1. All the following characteristics are from the characteristics of kapok tree except that it has .....

- a. large leaves.
- b. hand-shaped leaves.
- c. buttress roots.
- d. yellow seeds.

2. Among animals that have camouflage adaptation to hide from predators are .....

- a. penguin and polar bear.
- b. polar bear and bats.
- c. polar bear and panther chameleon.
- d. panther chameleon and penguin.

3. Wide leaves are considered as adaptations of wetland plants to .....

- a. search for water below soil surface.
- b. get large amount of sunlight.
- c. keep animals away from plants.
- d. resist the water waves.

(B) Give a reason for the following :

The shape of pine tree leaves is like a needle.

**2** (A) Complete the following sentences :

1. The ..... tree branches grow and gather on the top of its trunk to prevent animals from eating them, while ..... has tan-colored coat that provides camouflage in sandy, rocky environment.

2. Both of arctic fox and pine tree survive in ..... habitat, while both of panther chameleon and kapok tree survive in ..... habitat.

3. The thick fur coat helps ..... fox hunts in deep snow, while the blood movement in the feet of ..... keep their toes from freezing.

**(B) Just as we send messages via mobile, so some types of trees send messages through the wind.**

Mention the name of two trees that can send messages through the wind.

.....

**3** Look at the opposite figure, then answer the following questions :

a. Give two examples of animals that live in this habitat.

.....



b. Give two examples of plants that live in this habitat.

.....

c. Put (✓) or (✗) :

1. Plants of this habitat are characterized by having long, thick roots. ( )

2. Plants of this habitat have large, wide leaves. ( )

### Self-Assessment 4 till Lesson 4

**1** (A) Choose the correct answer :

1. The trunk in acacia tree stores ..... as the hump in the camel stores .....  
 a. oil, water.      b. water, milk.      c. oil, milk.      d. water, fat.

2. All the following sentences are correct about stomach except .....  
 a. it has teeth and tongue.  
 b. it receives the food from esophagus.  
 c. food changes into soupy liquid inside it.  
 d. it contains an acid.

3. All the following organs belong to the respiratory system except .....  
 a. nose.      b. throat.      c. lungs.      d. stomach.

**(B) Give a reason for the following :**

Saliva is very important in your mouth.

.....

**2** (A) Put (✓) or (✗) :

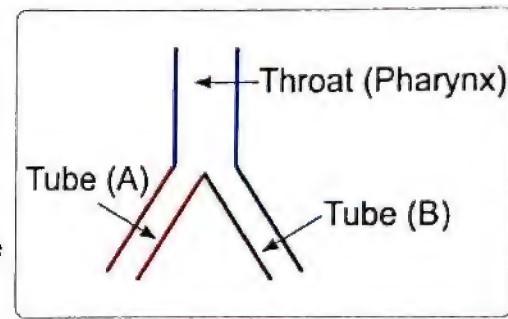
1. Caracal and fennec fox can hide in the desert as they have white-colored fur. ( )
2. Bodies of starred agama and panther chameleon are covered with scales. ( )
3. Dogs eat meat that is very difficult to be digested compared with grass. ( )

**(B) What happens if ... ?**

The small intestine was not supplied with blood vessels in the human body.

**3** Study the following diagram then answer the questions, knowing that tube (A) through which air passes, while tube (B) through which food passes :

1. Tube (A) represent the .....
2. Tube (B) represent the .....
3. Tube (A) connects throat to the .....
4. Tube (B) connects throat to the .....
5. Tube (A) belongs to ..... system, while tube (B) belongs to ..... system.



**Self-Assessment 5 till Lesson 5**

**1** (A) Choose the correct answer :

1. Air is important for human, fish and animals because .....
  - a. it contains carbon dioxide gas that is important for breathing.
  - b. it contains carbon dioxide gas that is important for digestion.
  - c. it contains oxygen gas that is important for breathing.
  - d. it contains oxygen gas that is important for digestion.
2. Cutting down rainforests, may help human to make furnitures, but also may cause disappearance of .....
  - a. starred agama lizard.
  - b. bull shark.
  - c. panther chameleon lizard.
  - d. polar bear.
3. All the following living organisms need food and can get oxygen gas from air to obtain energy, except .....
  - a. cows.
  - b. bull sharks.
  - c. pine trees.
  - d. humans.

**(B) Give a reason for the following :**

Air pollution is dangerous for human, while water pollution is dangerous for fish and human.

.....  
.....  
.....

**2 (A) Put (✓) or (✗) :**

1. Human can pollute the environment, but he cannot restore it. ( )
2. Both lungs and gills are organs that present in the digestive system of both human and fish. ( )
3. When an ecosystem is completely polluted, no longer organisms can live in it. ( )

**(B) If you travel to the environment of arctic foxes, which one of the following advices is wrong :**

1. You have to wear heavy clothes.
2. You have to eat more hot food.
3. You have to drink more cold water.
4. You have to drink more hot drinks.

**3 Choose from column (A), what suits it in column (B) and (C) :**

<b>Species</b>	<b>Habitat</b>	<b>Way of breathing</b>
1. Lizard	A. Polar region	a. Take in oxygen from air.
2. Fish	B. Desert	b. Take in oxygen from water.
3. Penguin	C. Water	c. Take in oxygen from air and water.

1. .... → ....

2. .... → ....

3. .... → ....

## Self-Assessment 6 till Lesson 6

**1** (A) Cross out the odd words :

1. Frog – Starred agama – Salamander – Toad. (.....)
2. Water lilies – Fish – Palm tree – Amphibian. (.....)
3. Golden frog – Panther chameleon lizard – Kapok tree – Acacia tree. (.....)

(B) Give a reason for the following :

Amphibians are endangered species.

.....

.....

.....

**2** (A) Write the scientific term of each of the following :

1. A type of living organisms that can breathe in air and in water. (.....)
2. An organ with structural adaptation that enable toad to breathe in water. (.....)
3. The grassland habitat of acacia tree, in which we cannot find amphibians during dry seasons. (.....)

(B) Write one animal and one plant that live in each environment of the following :

Environment	Animal	Plant
1. Desert :	.....	.....
2. Rainfall forest :	.....	.....
3. Polar region :	.....	.....
4. Salt water :	.....	.....

**3** If you are one of the scientists who help amphibians survive.

You can do all the following for its habitat, except .....

1. removing air pollutants.
2. removing water pollutants.
3. removing their natural predators.
4. removing water from ponds and streams.

(Give a reason for your choice)

.....

.....

.....

# **Model Exam**

on concept (1.1)

**Total mark**

20

(5 marks)

**1** (A) Choose the correct answer :



**(B) Give a reason for the following :**

Gills is a unique physical adaptation in fish.

**2** (A) Put (✓) or (✗) :

1. Both salamander and fish can breathe through lungs. ( )

2. In polar environment, the sandy-colored fur of caracal helps it blend in with snow. ( )

3. Panther chameleon and agama lizard can use one of their eyes for searching for food, and the other one to lookout for danger. ( )

4. Adaptation to store water, is an important character for plants that live in dry desert environment. ( )

(B) What happens if ... ?

The diaphragm moves upward during exhalation

**3 (A) Correct the underlined words :**

(5 marks)

1. Plowing grasslands is one of the natural changes, which cause severe damage to the agricultural fields. (.....)
2. Reptiles like toads, have two different ways for breathing. (.....)
3. Fish use gills to take carbon dioxide gas out of the water. (.....)
4. Golden frog is an extinct species. (.....)

**(B) Give only one example of behavioral adaptation in bull shark.**

.....  
.....

**4 (A) Write the scientific term of each of the following :**

(5 marks)

1. It covers the body of some type of bears, to keep its body warm and to blend in with snow. (.....)
2. A feature present in bull shark, in which the lower surface of its body is lighter than its upper surface. (.....)
3. A plant lives in salt water environment, and it has long roots to resist water waves. (.....)
4. A liquid substance present in mouth and begins to break food down, by moistens its bites. (.....)

**(B) Cross out the odd word :**

1. Penguin – Acacia tree – Pine tree – Polar bear. (.....)
2. Panther chameleon – Fennec fox – Bull shark – Agama lizard. (.....)

# Self-Assessments

on concept (1.2)

## Self-Assessment 7 On Lesson 1

### 1 (A) Complete the following sentences:

1. Dolphins use echolocation property that help them to ..... and .....
2. Human use senses of ..... and ..... when watching a football game in the stadium.
3. Chameleons use their ..... to see the food, while they have a very long ..... to help them catch and taste insects.

### (B) Give a reason for the following :

Chameleon can distinguish between its prey and predator at the same time.

.....  
.....  
.....

### 2 (A) Put (✓) or (✗) :

1. The owl uses the sense of touch to hunt its prey at night. ( )
2. Fox has good senses of hearing and sight so that it can avoid danger. ( )
3. A dog uses its sense of smell and eyesight to identify its owner. ( )

### (B) Observe the opposite figure, then answer the following questions:

1. What senses do you use to identify the food in this picture?

.....  
.....  
.....



### 3 Observe the following figure, then choose the correct answer :

1. Arrow number (1) represents .....
  - a. sound waves produced by the dolphin.
  - b. the echo bounced back from the rocky object.
  - c. light waves produced by the dolphin.
  - d. light waves produced by the rocky object.
2. Arrow number (2) represents .....
  - a. sound waves produced by the dolphin.
  - b. the echo bounced back to the dolphin.
  - c. light waves produced by the dolphin.
  - d. light waves bounced back to the dolphin.



3. The dolphin uses this property to .....
  - a. see objects underwater.
  - b. see objects above the water surface.
  - c. locate objects and living organisms on the beach.
  - d. locate objects and living organisms under water.
  
4. The sense used by the dolphin in this picture is the .....
  - a. smell.
  - b. taste.
  - c. hearing.
  - d. sight.

### Self-Assessment 8 till Lesson 2

**1 (A) Choose the correct answer :**

1. An animal that flies and relies on the bouncing of sound to catch its prey is a/an .....
  - a. owl.
  - b. snake.
  - c. bat.
  - d. dolphin.
  
2. Bats and dolphins are animals that greatly differ in size, but they have one thing in common as they both .....
  - a. live in the same environment.
  - b. prey on the same prey.
  - c. depend on echolocation property in their hunting.
  - d. depend on gills to breathe.
  
3. The Egyptian mongoose makes a group of sounds that .....
  - a. bounce back to it when it hits a wall or its prey.
  - b. is similar to the sounds made by dolphins and bats.
  - c. can be heard by tasting.
  - d. is the language of communication with other mongooses.

**(B) Give a reason for the following :**

The nerves spread across the whole body.

.....

.....

.....

**2 (A) Put (✓) or (✗) :**

1. A dolphin produces sound waves through its ears so it can locate its prey. ( )
2. It is difficult for a dolphin to be a prey of the owl. ( )
3. Dolphins, Egyptian mongooses, and frogs eat the same kind of food. ( )

(B) Read the following paragraph, then correct the underlined words.

When you hear a fire alarm, that means you have received this information through sensory receptors in the eye, then nerves sent a signal to the heart, where this signal travels as sound impulses.

**3** Place each of the following animals in front of the sentence describing it.

(Dolphins – Owls – Snakes – Bats)

1. .... can fly but cannot see well in the dark.
2. .... rely on the heat produced by the prey's body to hunt it at night.
3. .... are nocturnal birds with bowl-shaped faces.
4. .... live in water and rely on echolocation to find food.

### Self-Assessment 9 till Lesson 3

**1** (A) Choose the correct answer :

1. The nervous system of ...., such as elephants, dogs, consists of a brain, a spinal cord, and nerves.  
a. rodents      b. birds      c. mammals      d. reptiles
2. .... can detect and amplify distant sounds due to their heads that look like bowls.  
a. Owls      b. Dogs      c. Mongooses      d. Chameleons
3. If you are in your room, you can tell what kind of food is being prepared in the kitchen by using your sense of ....  
a. sight.      b. hearing.      c. touch.      d. smell.

(B) What happens if the jerboa's legs are all short ?

**2** (A) Correct the underlined words :

1. The jerboa's reaction time is very slow. (.....)
2. The distinguish between quiet and loud music depends on your sense of sight. (.....)
3. Nerves are an important part of the digestive system. (.....)

**(B) Give a reason for the following :**  
Dolphins have super sensory organs.

**3 Observe the following figures, then complete the following sentences :**



Animal (1)



Animal (2)

1. During the night, animal ..... can locate animal ..... by the heat produced from its body as its sense of sight does not work well at night.
2. Animal ..... can sense animal ..... based on its large ears, which have sensory receptors able to send a message through a network of nerves to the brain.
2. Nocturnal activity of animal ..... is an example of a behavioral adaptation, while large ears of animal ..... are an example of a structural adaptation.

### Self-Assessment 10 till Lesson 4

**1 (A) Choose the correct answer :**

1. In an animal, when the reaction time is very long, that means the animal.....
  - a. can survive.
  - b. can reproduce.
  - c. is at risk of extinction.
  - d. can run away quickly.
2. The nervous system plays an important role in .....
  - a. obtaining energy from food.
  - b. obtaining energy from oxygen.
  - c. responding to different stimuli.
  - d. absorbing food from small intestine.
3. If the sensory receptors in the tongue are damaged completely such that they lose their function, this person's ability to taste food will .....
  - a. increase.
  - b. decrease.
  - c. disappear.
  - d. not change.

**(B) In which case does your reaction time faster and why?**

Running when you hear a wild animal coming at you or when you see it coming at you.

**2 (A) Write the scientific term of each of the following :**

1. The time taken by an organism's body to react to different stimuli around it. (.....)
2. The form in which the information messages transmit through nerves from the sensory organs to the brain. (.....)
3. Special type of nerves found in sensory organs and responsible for sending messages to the brain. (.....)

**(B) A hunter was trying to catch a deer but he was not being careful to not make any noise or movement, so the deer was escaped.**

In your opinion, what happened in the deer's nervous system that helped it to escape?

.....

.....

**3 Order the following statements that illustrate how the rabbit's brain processes running away from the fox before predating it.**

- (.....) The rabbit's brain processes information.
- (.....) The rabbit's nerves sent a signal to the brain.
- (.....) The rabbit's brain sent a signal to its feet muscles to escape.
- (.....) The rabbit saw a fox moving towards it to devour it.

**Self-Assessment 11 till Lesson 5****1 (A) Choose the correct answer :**

1. When you see an orange falling from a tree to the ground, which of your senses could the brain process its signals fast in this situation? ....  
a. Hearing.      b. Touch.      c. Sight.      d. Smell.
2. When your leg hits a rock while walking down in a street, the sensory receptors in your leg send a message to your brain through a network of nerves passing through the .....  
a. esophagus.    b. trachea.      c. lungs.      d. spinal cord.
3. Both dolphins and owls have sharp sense of .....  
a. sight.      b. hearing.      c. smell.      d. touch.

**(B) Give a reason for the following :**

An owl can detect and amplify distant sounds and direct them to its ears.

.....

.....

**2** (A) Correct the underlined words :

1. The rely of bats on echolocation to find insects at night is considered as a behavioral adaptation. (.....)
2. When the echo bounces back to the dolphin, its sensory receptors send a message to the heart through a network of nerves, telling it where its prey is. (.....)
3. A snake can locate a jerboa at night through the light produced from the jerboa's body. (.....)

**(B)** Circle the organism that has a sharp sense of hearing from the following organisms :

- |                     |           |             |
|---------------------|-----------|-------------|
| 1. Egyptian jerboa. | 2. Snake. | 3. Bat.     |
| 4. Fennec fox.      | 5. Human. | 6. Dolphin. |

**3** Put (✓) in front of the correct statements related to the owl, then classify the selected sentences into structural and behavioral adaptations by writing the sentence number in the table below :

1. Its head is covered with feathers. ( )
2. It is from reptiles. ( )
3. It has a sharp sense of hearing. ( )
4. It becomes active at night to catch its prey. ( )
5. Its body is covered with scales. ( )
6. It turns its head in all directions. ( )

Type of adaptation	Sentence number
1. Structural adaptation :	.....
2. Behavioral adaptation :	.....

## **Model Exam**

on concept (1.2)

Total mark  
—  
20

(5 marks)

**1 (A) Choose the correct answer :**

- ..... are senses to distinguish between milk and water.
    - Taste and sight
    - Smell and hearing
    - Sight and hearing
    - Taste and hearing
  - Bats can fly without hitting walls because they can .....
    - hear the echo reflected from them.
    - touch them.
    - see them clearly at night.
    - smell them.
  - When your hand touches the spines of a cactus plant, it is withdrawn in .....
    - one minute.
    - two minutes.
    - more than one hour.
    - less than one second.
  - Brain, nerves and sensory receptors are parts of nervous system where,
    - only sensory receptors work individually.
    - only the brain works individually.
    - they work together with each other.
    - they work separately from each other.

(B) Give a reason for the following :

Running to save a young child falling from his seat

**2 (A) Correct the underlined words :**

### **REFERENCES**

1. When you hear the fire alarm, your eyes send a signal to the brain. (15 marks)

2. The spinal cord is responsible for processing the information coming through ears. ( )

3. The dog has sharp senses of smell and taste. ( )

4. The sense of eyesight in bats is stronger than that in owls. ( )

### (B) What happens if ... ?

Owls cannot turn their heads in all directions

**3 (A)** Write the scientific term of each of the following :

(5 marks)

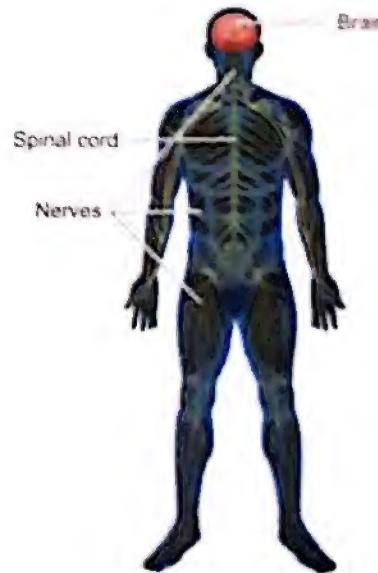
1. The time taken by an organism's body to respond to different reactions around it. (.....)
2. A sense by which you can recognize the sour flavor of vinegar. (.....)
3. A system that controls all the body functions and nerves are one of its parts. (.....)
4. The organ which receives and processes the messages sent from the sensory receptors that are found in a jerboa's ears. (.....)

**(B)** Look at the opposite figure that shows the structure of the human nervous system, then answer the questions :

1. Which part spreads all around the human body ?
- .....

2. Which part is found inside the backbone of the human body ?
- .....

3. Which part represents the main control centre in the human body ?
- .....

**4 (A)** Complete the following sentences :

(5 marks)

1. The ..... is the organ that sends information to the brain when you smell the scent of a nice perfume.
2. The response of the eye nerves is ..... than that of the ear nerves.
3. Hopping of the Egyptian jerboa in zigzag patterns to stay away from the snakes attacking it, is considered as a ..... adaptation.
4. Owls can detect the places of their preys by using the super senses of ..... and .....

**(B)** Order the following statements which explain how the brain processes information :

- (.....) The brain sends a signal to the muscles to move to start the race.  
 (.....) Hearing the whistle sound to start the race.  
 (.....) The brain processes information.  
 (.....) The nerves of the ears send a signal to the brain.

# Self-Assessments

on concept (1.3)

## Self-Assessment 12 On Lesson 1

**1** (A) Put (✓) or (✗) :

1. Light sensory receptors present in ears and send electric impulses to the brain for processing information. ( )
2. The membrane that present on the back of cats eyes, depends on echo to detect the prey location. ( )
3. Fishing cat has excellent night vision better than human. ( )

(B) Give a reason for the following :

The eye of fishing cat has the ability to collect more available light at night.

**2** (A) Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Snake	a. has strong wings, that help it to fly.
2. Fishing cat	b. can feel the warm of prey body at night.
3. Human	c. has night vision better than snake and lower than fishing cat.
	d. has a mirror-like membrane on the back of its eye.

1. .... 2. .... 3. ....

(B) Read the following paragraph, then correct the underlined words :

The hunt at night needs super sensory adaptations in predators, such as sense of taste in fishing cat and sense of sight in bat, that are weaker than those in human so they can hunt at night.

**3** Choose the correct answer :

1. If human eyes contain a mirror-like membrane like which is found in fishing cat's eyes, so all the following statements are correct except ....
  - a. his eyes seem to glow at night.
  - b. he has excellent night vision.
  - c. he doesn't need night vision goggles.
  - d. he needs a strong source of light to can see at night.

2. All the following have structural adaptation in their ears to strong the sense of hearing for them except .....  
 a. fennec fox.    b. arctic fox.    c. owl.    d. snake.
3. Which of the following animals has the ability to fly but can't see at night ?  
 a. Owl.    b. Snake.    c. Bat.    d. Fennec fox.
4. All the following have structural adaptation in their sense of sight so it is strong except .....  
 a. owl.    b. fishing cat.  
 c. panther chameleon.    d. bat.

### Self-Assessment 13 till Lesson 2

**1 (A) Choose the correct answer :**

1. All of the following are nocturnal animals, except .....  
 a. fishing cats.    b. bats.  
 c. barbary fig.    d. tarsiers.
2. If there is a switched on radio in a complete dark room, you .....  
 a. can see the radio.    b. can hear the radio.  
 c. can see and hear the radio.    d. cannot hear the radio.
3. The eyes can move in their sockets and the pupils is not adapted to night vision in .....  
 a. tarsiers.    b. owls.    c. cats.    d. humans.

**(B) What happens if ... ?**

Human has the same structure of nocturnal animal's eyes.

**2 (A) Put (✓) or (✗) :**

1. If the human has the same eye structure of fishing cat, he doesn't need night vision goggles to see in the dark. ( )
2. If there is a little light in a dark room, you can see an object in this room when your eyes adjusted to the darkness. ( )
3. There are some similarities between owls and tarsiers in structural adaptation of their eyes to the darkness. ( )

**(B) Give a reason for the following :**

Although tarsier has huge eyes, it can't see green lizard stands on green leaves.

**3** Write the correct name of animal in front of each sentence using the following words :

(Owl – Fishing cat – Dolphin – Bat – Tarsier – Jerboa – Snake)

1. You can see its eyes glow at night. (.....)
2. It uses echo to hunt fish. (.....)
3. Two animals one is the predator which using its ability to sense heat and the other is the prey of the first animal which hops to escape. (..... and .....
4. It has the same structure of eye of owl but can't fly. (.....)
5. The shape of its face collect and amplify different sounds. (.....)
6. It flies at night and hunts by receiving echo bouncing off its prey. (.....)

### Self-Assessment 14 till Lesson 3

**1** (A) Choose the correct answer :

1. In a completely dark room, ..... entering the eyes.
  - a. some light
  - b. bright light
  - c. dim light
  - d. no light
2. Night vision goggles look like ..... that present in nocturnal animals.
  - a. pupils
  - b. nerves
  - c. tapetum lucidum
  - d. blood vessels
3. If the light waves fall on an object and don't bounce off it completely, then you .....
  - a. can see this object.
  - b. cannot see this object.
  - c. can receive some of the reflected light waves.
  - d. can receive all the reflected light waves.

(B) Give a reason for the following :

Tapetum lucidum works like a mirror.

.....

**2** (A) Put (✓) or (✗) :

1. If an animal eyes glow at night, this means its eyes must contain mirror-like membrane. ( )
2. Pupils of the eyes present in nocturnal animals and absent in other animals and humans. ( )
3. In complete darkness, the eyes of nocturnal animals doesn't glow. ( )

## (B) Cross out the odd word :

1. Owl – Fishing cat – Snake – Tarsier.
2. Cat – Dog – Deer – Bat.

(        )  
(        )

## 3 If there is a wild cat moves around in a forest at night.

Choose the correct answer :

1. The eyes of this wild cat look shine at night because it has.....
  - a. huge eyes.
  - b. tapetum lucidum.
  - c. large ears.
  - d. long legs.
2. All the following animals can see this wild cat except .....
  - a. tarsier.
  - b. fishing cat.
  - c. bat.
  - d. owl.
3. Which of the following animals the wild cat can't recognize it ? .....
  - a. Tarsier.
  - b. Chameleon.
  - c. Snake.
  - d. Jerboa.

## Self-Assessment 15 till Lesson 4

## 1 (A) Put (✓) or (✗) :

1. You can see a green ball inside a transparent glass box. (      )
2. Both opaque objects and transparent objects, reflect light rays. (      )
3. In a completely dark room, we can see the transparent objects but opaque objects cannot be seen. (      )

## (B) Give a reason for the following :

You can see clearly through lens.

## 2 (A) Choose from column (B), what suits it in column (A) :

(A)	(B)
1. Water	a. It is an opaque material, that reflects light in different directions.
2. Glass	b. It is a source of light energy.
3. Wood	c. It is a transparent material that is used in making windows. d. It is a transparent liquid material.

3.

1. ....

2. ....

**(B) Cross out the odd word :**

1. Mirror – Cloth – Paper – Brick.
2. Wood door – Book – Wall – Glass cup.

(.....)  
(.....)

**3** Look at the opposite figure, then answer the question below :

1. Will you see the light from another side of cup ? Explain why.
- .....



2. Water and glass cup are considered .....
  - a. both are opaque materials.
  - b. both are transparent materials.
  - c. water is an opaque material, while glass is a transparent one.
  - d. glass is an opaque material, while water is a transparent one.

### Self-Assessment 16 till Lesson 6

**1** (A) Put (✓) or (✗) :

1. The glasses used to correct blurry vision, must be made up of a transparent material to allow light rays to pass through. ( )
2. The optometrists learn how to prevent blindness, treat breathing diseases and correct vision. ( )
3. The difficulty of distinguishing between colors, is one of the eye defects. ( )

**(B) What happens if ... ?**

The structure of fishing cat's eye is the same like human.

.....

**2** (A) Write the scientific term of each of the following :

1. A type of surgery that is done to correct vision defects. (.....)
2. It is a condition in which the person eye lens does not focus the light rays properly. (.....)
3. The opening through which the light entered the eye. (.....)

**(B) Give a reason for the following :**

Bat can find its food at night although it has a weak sense of sight.

.....

**E** If one of your classmates can't see the board well.

Answer the following questions :

1. Your classmate may suffer from all the following problems except .....
  - a. he can't see far objects.
  - b. he can't see near objects.
  - c. his eye lens doesn't focus the light properly.
  - d. his tapetum lucidum layer has a big problem.
2. Your classmate should see .....
  - a. an optometrist.
  - b. a biologist.
  - c. an dentist.
  - d. an engineer.
3. Mention three ways through which the sight of your classmate can be treated.  
.....  
.....  
.....

# **Model Exam**

on concept (1.3)

**Total mark**

20

(5 marks)

**1 (A) Choose the correct answer :**



(B) Give a reason for the following :

You can see an object placed behind a glass cup.

**2** (A) Put (✓) or (✗) :

(5 marks)

1. The biologist, is the person who can test either the eye lens is focusing properly or not. ( )
  2. Cat's eyes look like small lighted lamps at night. ( )
  3. In a complete dark room, you cannot see an object but you can see its shadow. ( )
  4. Human can see in dim light as well as in bright light, if his eyes contain a tapetum lucidum layer. ( )

#### (B) What happens if ... ?

Light falls on a rough surface according to the reflected light rays.

**3 (A) Complete the following sentences :**

(5 marks)

1. The ..... is the main control center in humans and animals bodies, while ..... are considered the organs of sight in their bodies.
2. Tarsier depend on the sense of ..... in the weakest light levels, while dolphin can hunt depending on its sense of .....
3. In the eyes of ..... animals, there is a tapetum lucidum that ..... light like a mirror.
4. Paper and a piece of cloth are considered ..... surfaces, that diffuse or scatter ..... energy.

**(B) Cross out the odd word :**

1. Fire – The Sun – The Moon. (.....)
2. Fishing cat – Owl – Dolphin. (.....)

**4 (A) Write the scientific term of each of the following :**

(5 marks)

1. It is an opening in the eyes of humans and animals, through which the light can enter they eye. (.....)
2. A life-saving structural adaptation that gives fishing cat excellent night vision. (.....)
3. A transparent material, that we use it in breathing and surrounds us everywhere. (.....)
4. The part in the eye structure, that redirects the falling light rays on the back of the eye. (.....)

**(B) Both fishing cat and bat are nocturnal animals, explain the sense on which each of them depends on to hunt a prey.**

.....

.....

.....

.....

.....

.....

# Self-Assessments

on concept (1.4)

## Self-Assessment 17 On Lesson 1

1 (A) Put (✓) or (✗) :

1. Fireflies make light flashes by using their legs. ( )
2. Papyrus paper was created by Chinese. ( )
3. Using flashing LED lights to imitate the fireflies patterns is an example of the interaction between humans and nature. ( )

(B) Give a reason for the following :

The fireflies wings play an important role in the communication between them.

.....  
.....  
.....

2 (A) Correct the underlined words :

1. Changing the flash patterns of fireflies is considered as a structural adaptation. (.....)
2. The writing system that was created by Babylonians called hieroglyphics language. (.....)
3. Reading is a type of communication that depends on the sense of taste. (.....)

(B) Mention one example of insects using light to communicate with each other, and how can they produce this light ?

.....  
.....  
.....

3 If we imagine that a conversation took place between 4 people who represent ancient times as follows :

**Person (1)** : We created papyrus and a hieroglyphic language.

**Person (2)** : We created a form of paper using the mulberry and bamboo plants.

**Person (3)** : We created a writing system called cuneiform drawings.

**Person (4)** : We created another hieroglyphs and we live in central America.

Put (✓) in front of right statements and (✗) in front of the incorrect ones :

1. Person (1) represents ancient Egyptians. ( )
2. Person (2) represents the Babylonians. ( )
3. Person (3) represents ancient Chinese. ( )
4. Person (4) represents ancient Mayans. ( )

### 1 (A) Choose the correct answer :

1. All the following living organisms use the sense of hearing to communicate with each other, except .....  
a. dolphins.      b. whales.      c. fireflies.      d. bats.
2. Traffic lights depend on the sense of sight in communication like .....  
a. whales.      b. fireflies.      c. dolphins.      d. snakes.
3. The ..... is the only living organism that can use language and speech to communicate with each other.  
a. whale      b. owl      c. firefly      d. human

### (B) Give reason for the following :

The humpback whales produce low-pitched sounds during summer months.

.....

### 2 (A) Put (✓) or (✗) :

1. Humpback whales produce high-pitched sound during summer season. ( )
2. Writing is a communication type that is used by human only. ( )
3. The Babylonians were created a writing system called hieroglyphs. ( )

### (B) Mention the name of two sea animals that use sound energy in their communication.

.....

### 3 Humpback whales can sing different songs as well as the human singers.

1. What are the reasons for their songs ? (mention 2 reasons)  
.....
2. What is the difference between their songs in winter and in summer. (concerning sound pitch)  
.....
3. If you know that both of whales and dolphins have lungs.  
a) Do you think that humpback and dolphins can respire under water like fish ?  
.....  
b) What is the name of the gas that they respire ?  
.....

**Self-Assessment 19 till Lesson 3****1 (A) Complete the following sentences :**

1. Morse code can depend on the sense of ..... or .....
2. Morse code and language depend on the sense of ..... in communication.
3. Both fireflies and rescue flare depend on ..... energy for communication.

**(B) What happens if ... ?**

The winter months started according to the communication of whales.

**2 (A) Correct the underlined words :**

1. Morse code uses dashes and question marks, that there combinations represent different letters of the alphabet. (.....)
2. The winter months are considered as the feeding season for humpback whales. (.....)
3. Both Morse code and whales depend on the sense of smell in communication. (.....)

**(B) Mention two types of codes that depend on the sense of hearing.****3 Based on Morse code in front of you, Mona can write her name as follows :**

M	O	N	A
--	---	--	--

1. How can Ramy write his name using Morse code ?

R	A	M	Y

2. How can you write your name using Morse code ?

A • —	N — •
B — • •	O — —
C — • — •	P — — —
D — • •	Q — — — •
E •	R • — —
F • • — •	S • • •
G — — •	T —
H • • •	U • • —
I • •	V • • — —
J • — — —	W — —
K — • —	X — — • •
L • — • •	Y — — • —
M — —	Z — — — •

Morse code


## Self-Assessment 20 till Lesson 4

**1** (A) Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Fireflies	a. depend on the sense of smell in their communication.
2. Whales	b. depend on the sense of taste in their communication.
3. Ants	c. depend on the sense of sight in their communication.
	d. depend on the sense of hearing in their communication.

1. .... 2. .... 3. ....

(B) Give a reason for the following :

Hikers always take mirrors with them during their travelling.

**2** (A) Write the scientific term of each of the following :

1. It is a code that uses symbols in special pattern and their arrangement form a word with a meaning. ( )
2. It is an insect that make a movement in figure-eight pattern to communicate with each other. ( )
3. A writing system that was created by ancient Egyptians and made up of about 700 symbols. ( )

(B) Mention the name of two insects that use the sense of sight to communicate with each other.

**3** Read the following paragraph, then answer the questions :

If there is a family consisting of a father, mother and one child. A father is interested in protecting his family from any external danger. The mother goes to the market to buy food for the family. Sometimes the son informs his mother that there is only a small piece of cheese left in the fridge.

According to your study to the life of ants, which character in the previous paragraph represents each of the following ?

- a. .... represents the nurse ant.
- b. .... represents the scout ant.
- c. .... represents the soldier ant.

**Self-Assessment 21 till Lesson 5****1 (A) Complete the following sentences :**

1. Both of the cane of a blind person and whales produce ..... pitched sound during communication.
2. Scientists inspired the idea of blind person's cane from the echolocation of bats that is considered as ..... adaptation.
3. Light can be used instead of ..... in Morse code.

**(B) Give a reason for the following :**

People use signal fires.

---

**2 (A) Put (✓) or (✗) :**

1. The cane of a blind person is like whales in that both of them use echolocation. ( )
2. Both honeybee and ant depend on the sense of smell in their communication. ( )
3. According to Morse code we can use light energy and sound energy in communication. ( )

**(B) Mention two living organisms that use smelly messages in their communication.**

---

**3 Look at the following photos, then answer the questions :**

Fig. (1)  
Night-vision goggles



Fig. (2)  
Blind person's cane

1. Device in figure (.....) is used to help people to see in low light areas.
2. Device in figure (.....) is used by blind people.
3. Device in figure (.....) is inspired from bats.
4. Device in figure (.....) is inspired from cats.

## **Model Exam**

on concept (1.4)

**Total mark**

20

(5 marks)

**1 (A) Choose the correct answer :**



**(B) Give a reason for the following :**

The symbols that are used in writing are in a specific pattern.

**2** (A) Put (✓) or (✗) :

(5 marks)

1. The sound pitch of a blind person's cane is too high for humans to hear. ( )  
2. Tarsier can use echolocation in communication. ( )  
3. Humpback whales produce only one type of songs. ( )  
4. Fireflies use Morse code during their communication. ( )

### (B) What happens if ... ?

Decreasing the amount of food in ant's colony.

**3 (A) Complete the following sentences :**

(5 marks)

- 4) Complete the following sentences:

  1. Music and language are ..... that use the sense of ..... to communicate.
  2. Morse code can use ..... instead of sound where, long flashes represent ..... , while ..... flashes represent dots.
  3. Whales and bats use ..... sound in their communication.
  4. Some insects such as ..... , use movements by doing a special dances to communicate with each other, while ants use their sense of ..... to communicate with each other.

(B) The sense of sight and the sense of hearing are used in different types of communications. Answer the following question : (5)



**4** (A) Write the scientific term of each of the following :

1. A device used by blind people to walk safely. (.....)
  2. A kind of paper that is created by ancient Egyptians for writing. (.....)
  3. It is information that transformed into another representative form. (.....)
  4. The short beeps in Morse code. (.....)

(B) Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Bats	a. make a special dance to communicate with each other.
2. Bees	b. using echolocation during flying.
3. Blind person's cane	c. using flash lights to communicate with each other.
	d. its vibrations tell the blind person to the directions.

## **Model Exam**

### on Theme (1)

Total mark  
        
20  
(5 marks)

**1 (A) Choose the correct answer :**



### (B) What happens if ... ?

The warm blood vessels and cold blood vessels in penguin's feet are not weaved around each other.

**2** (A) Put (✓) or (✗) :

- (A) Put (✓) or (✗) .

  1. The agama lizard blend in with big green trees in its environment, to hide from its enemies. ( )
  2. The sense of hearing of dolphins is stronger than that of human. ( )
  3. Eyes are one of the five senses, on which animals and humans depend to see the surroundings. ( )
  4. Speaking is the only way of communication between people. ( )

**(B) Cross out the odd word :**

- Q) Cross out the odd word : (.....)

  1. Palm tree – Cactus plant – Mangrove tree – Barbary fig. (.....)
  2. Brain – Spinal cord – Nerves – Lungs.

**3 (A) Complete the following sentences :**

(5 marks)

1. Huge eyes of owls and ..... help them to gather more light for excellent night vision.
2. A group of fireflies can change their own ..... to match the flashes of another group of fireflies to communicate.
3. All living organisms, breathe in oxygen gas, and gives out ..... as a waste product.
4. Echolocation property is used by bats and ..... to locate their preys.

**(B) Give a reason for the following :**

Gills is a unique structural adaptation in fish.

.....  
.....  
.....

**4 (A) Write the scientific term of each of the following :**

(5 marks)

1. An animal that can sense the body heat of its preys at night, by using a special part on its head. (.....)
2. The visible form of energy, that enables us to see. (.....)
3. The season in which the humpback whale produces low-pitched sound. (.....)
4. A large muscle in the human body that contracts during breathing in and relaxes during breathing out. (.....)

**(B) If you know that the color of desert jerboa is yellow like sand, as an structural adaptation :**

How does this adaptation help jerboa to survive ?

.....  
.....  
.....  
.....